COAL AGE

Volume 15 New York, April 10, 1919 Number 15

America's Opportunity in Foreign Markets

By Floyd W. Parsons

ONLY a man of super-courage would dare commit himself today as to just what are normal prices and normal business conditions. Industrial activity in America at the close of the war had reached a peak never before touched. Even recessions that have occurred since the signing of the armistice have not brought most lines of trade back to the volume sustained in pre-war days.

Nothing but experience will determine what level of prices is in keeping with current happenings. Old standards no longer rule. Labor has secured new power and wage reductions are being opposed successfully. The money of all nations has been inflated as never before. Pre-war scales no longer are precedents on which it is safe to base calculations.

Out of all the confusion, however, it is possible to discover a few guide-posts. Merchandise shipments from the United States during the first quarter of this year are approximately $1,750,000,000. Imports were less than $700,000,000, so that the balance of trade in our favor for January, February and March is more than a billion dollars. Since January, 1916, the trade balance in our favor totals nearly eleven billion dollars. No such record was ever attained by any nation before.

What the foregoing statement really means becomes more apparent when we say that during the thirty years preceding 1914 the favorable trade balance of the United States was not so large as this balance of the last thirty-nine months.

Such a one-sided volume of foreign trade cannot continue forever. If it did, we would soon find that we were expending our resources and our effort to no real advantage. Soon our customers on the other side of the Atlantic would be without funds to meet our bills, and the bottom of the business would drop out.

We have an advantage in foreign trade, and it is necessary that we hold it. Our continued success depends on the manner in which we finance future exports. Everyone knows that the man who buys must pay. Foreigners cannot at present meet their obligations to us with goods or gold. We must create credits against which other countries may draw if we are to retain their trade.

This being the case, we must look upon ourselves as international bankers and world investors as well as world traders. The United States Government cannot continue to provide the money for financing our merchandise exports. Corporations and individuals in America will be called upon to step into the breach and help desirable customers who are long on credit and short on funds. Our world standing depends largely on our readiness to accept the idea of a genuine community of interest throughout the earth.

In no field of trade are our foreign opportunities greater than in coal. Germany will not be able to resume her exports of fuel for some years, if ever. Great Britain is hoping to recover her position as a coal exporter, but the obstacles in her way are increasing. She normally ships 75,000,000 tons annually, but the increased cost of production now prevailing in England and Wales may change the situation materially.

The ability of Great Britain to recover her export markets for coal depends upon her cost of production. When the war commenced, the average cost per ton of large coal at the pit mouth at British collieries was $3.60; at the close of the war it was $8.40. The better-paid miners in 1914 received $10.56 per week; in 1918 they were paid $19.20 per week. Coincident with this large advance, the Welsh miners secured a 49-hour week for surface workers, and a special fee of 72 cents per day whether they worked or not.

When in addition to the foregoing statement concerning increased wages and a shorter day we add the fact that the yearly output of the British collier has continued to fall until now he produces less than a ton of coal each day, it appears certain that English and Welsh coal will have to be sold at a high price in foreign markets in the future.

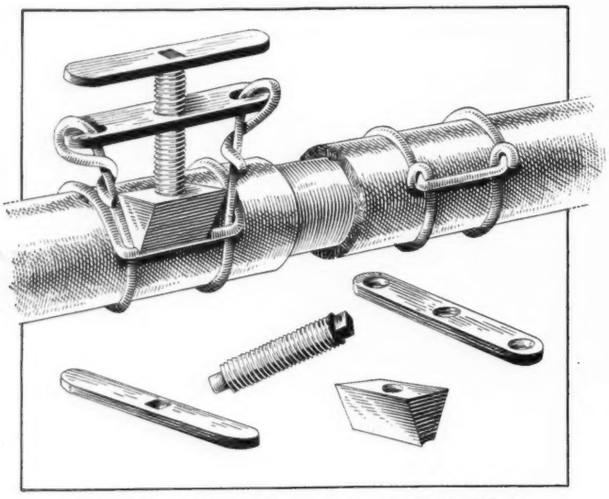
If the coal operators and miners in the United States work together in harmony, if the Miners' Union places no restrictions upon individual output, if we use more and still more machines underground, if we continue to produce from four to six times as much coal per man per day as is produced in foreign collieries, we may look forward with confidence to America's future as a coal-exporting nation. We may also rest assured that in such case the wages of American miners will be maintained on a satisfactory level.

IDEAS AND SUGGESTIONS

Hose-Clamping Tool

BY CHARLES H. WILLEY
Concord, N. H.

The tool illustrated is one that any handy man can make from a bolt and a few bits of old stock. The wire for binding the hose to its pipe or coupling is put around the hose in the manner indicated. The ends of the wire are secured through the holes of the cross-



EASILY MADE TOOL FOR CLAMPING HOSE

head. The head of the tool is placed so that the horizontal wire comes in the groove, then by holding the crosshead in one hand and tightening the screw with the other, the wire is drawn taut. When it is as tight as needed, the whole tool is turned about the wire, thus forming a hook that prevents the wire from loosening.

Accidents to Footmen

BY A PENNSYLVANIAN

Two men whom I have known for a long time were killed recently, while acting as footmen, one at the bottom of a breaker plane and the other at the foot of a slope. Both met death because of the failure of the "hitching staples."

A car weighing 13,000 lb., ascending a plane with a pitch of 8 deg., exerts a double shearing stress on its hitching staple bolts of about 7200 lb. Some collieries make a 1¼ in. hitching staple and others with heavier cars make them 1½ in. Both have four nuts on a standard thread. These staples go through the bumper sill of the car and are tightened against a plate ¼ x 3 in. punched to receive them.

The history of the accidents referred to above shows that the staple does not fail at the root of the thread, but breaks at the collar, which is drawn up against the bumper sill. When a mine car is derailed, it often falls between the ties, with the bumpers resting on the rail. To pull it on means a spread road and displaced ties. Accordingly, a bar is secured and tied under the hitching staple. The entire pull of lifting that car with its load is then put upon the hitching staple in a straight upward lift that fractures the metal at the point where it enters the bumper sill.

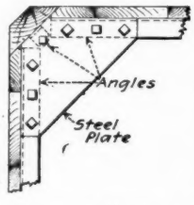
This may not always happen, but such treatment occurs again and again. Then some day, in going up a slope or plane, the staple may fail with accompanying loss of life, and destruction of cars and timber as the probable result.

Mine cars get to the shop often for repairs and their needs are tersely told in chalked inscriptions on doors and sides. But among all the cripples I have seen on shop tracks, none have been marked "Bad hitching staple." "Bad doors," "out of gage," "broken wheels," all are noted, but the car carpenters are never warned to inspect the pulling staples.

A little niche is required by law for a bottom man to step into while a car is ascending, but he cannot stay in it if he must couple trips or tend another side. He is in constant danger of falling lumps of coal coming back and hitting him, and if any inspection of the hitching staples would further safeguard him, it by all means should be made. Ropes do not often break, shackles seldom pull out, but failures of staples not infrequently bring death.

Steel Corner for Concrete Forms

Removable corners for concrete forms have been used for some time by E. H. Oneal, of Globe, Ariz. A special type for shaft concreting is shown in the accompanying sketch. It consists of a drilled and shaped steel corner plate to which are bolted angles carrying the side planks of the form and a special corner piece. While the cost of the individual forms was high, the cost per unit of concrete was low because the forms could be used over so many times. Some were re-used 26 times and were still in good condition. To strip such a form, the bolts are unscrewed and the separate plank sections lifted out.—*Engineering News-Record.*



Bushings for Car Wheels

BY E. P. HUMPHREY
Upper Lehigh, Penn.

The supply of brass bushings having become exhausted, and the demand for mine cars still remaining great, it was necessary to find some way in which to bush the worn wheels. The axle was $3\frac{1}{16}$ in. in diameter in some cases, but more often it was slightly less; so the idea of using 3-in. wrought pipe for a makeshift was tried. In cases where the axles were badly worn extra heavy pipe was used. This allowed some margin also for truing up. It was with a shade of doubt as to the practicability of this method that the cars were put into commission, but careful examination later showed satisfactory service with a saving.

Importance of Good Ground Connections

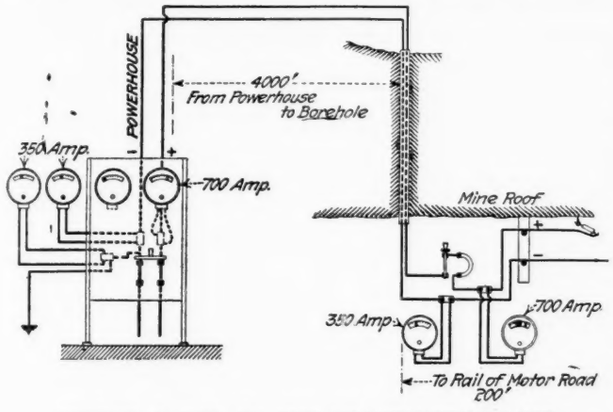
By J. J. Nolan
Linton, Ind.

The object in giving *Coal Age* readers the sketch and description of a peculiar condition experienced in transmitting electric power from one mine to another, at one of the mines with which I am familiar, is to emphasize the importance of having good ground or rail connections where locomotives and mining machines operate on direct current.

As one of the mines was in need of additional power the company decided to supply one whole side of this mine, including locomotives, mining machines, pumps and fan motors, from another mine about 4000 ft. away, which happened to have a spare unit.

A borehole was drilled near the extreme inside end of the haulage road and the transmission line brought overhead from the other power plant and passed down through this hole, connecting to the trolley and rails as shown.

A connection at the power house was made from the negative line above the main switch to the engine



COURSE TAKEN BY THE TRANSMISSION LINE

bed plates, interconnecting with pipes around the plant that extended under ground. This method was followed at all of this company's plants.

It was decided to make a test of amperage and drop the line voltage at the bottom of the drill hole with an average load to see if the line might require additional copper. Only one ammeter was used in the original test, and this was connected in the positive line.

The load varied from 300 to 700 amperes. The voltage drop was not considerable, but near the completion of the test it was noticed that the positive line became quite warm while the negative, which was of the same cross-section, remained cool. This led us to connect an additional ammeter in the negative line, as shown. The reading on this instrument was about half that of the positive line.

Making note of these readings we removed the meters, and proceeding to the power house we connected them as shown at the left of the switchboard, one in the line leading to earth and the other in the overhead line. This was done to satisfy ourselves as to whether this large amount of current could be coming through the earth for this distance, since there were no connections underground of workings between the two mines which might allow current to find its way along pipes or rails.

The readings of the positive and negative overhead lines leaving the board showed the same ratio as existed at the bottom of the borehole. The ammeter on the negative ground line showed the balance of the negative load, which amount came this distance through the earth.

Upon examination of the connections around the switch and rails at the extreme inside end of the haulage road, several poor connections were found. This accounted for a large part of the current at this point taking the path of least resistance, which was the earth. Making all connections in a proper and secure manner at this point did not materially lessen the voltage drop from the readings taken before.

Discontent and Its Remedy

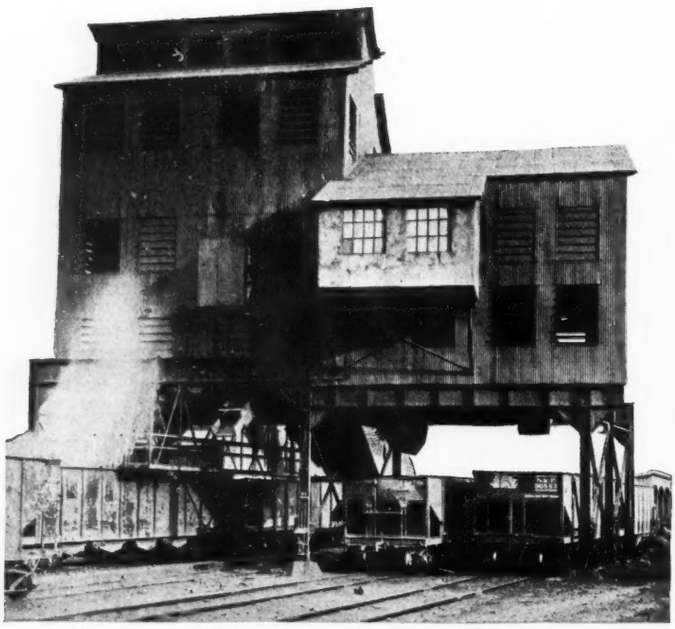
Of the many kinds and degrees of diseases the most pernicious and far-reaching is the mental disease of discontent. However, it is only when this discontent is turned into vicious channels that it becomes dangerous, because discontent may also be the index of a progressive mind. If it is correctly diagnosed, and the proper remedial measures are applied, discontent in a body of workmen may be cured. The old idea that this particular disease can be cured by the methods of an Indian medicine-man should be discarded forever. The ailment, like all human ills, especially those of a mental nature, requires delicacy in treatment inasmuch as the patient generally lacks faith in the practitioner. More and more corporations are coming to realize that labor must be as carefully considered and developed as expensive mechanical equipment. This is perhaps more true of the coal industry than of many others, owing to the varied character of the labor supply.

The problem of unrest is broad and constant. While almost all coal corporations have welfare bureaus of one kind or another, the real way in which to handle the problem is to squarely recognize that the problem exists, and to place the responsibility of its solution in charge of an official who shall pay attention to nothing else.

This official may be a full-fledged personnel efficiency expert or just an ordinary executive who knows workingmen and has the ability to handle them. His task should not be that of an autocrat with a religious fervor to crush out all discontent among his charges. Rather it should be to discover the real cause of the discontent and then to apply the correct remedy.

As stated before, this discontent may be only the desire of a workingman to advance to a better position, or it may be due to the fact that a workingman is unfitted for his present job and would be happier at another task more suitable to his inclinations. In a way the official I have in mind would be a surgeon to all the petty industrial ills to which the labor body of an industry is heir. Hand in hand with him should work the medical doctor, whose duty it would be to attend to the physical well-being of the workingmen.

Obviously, discontent means slowing up in work, in enthusiastic application, and in the desire to become more efficient. Even ill-health cannot affect a workingman's power to labor as much as can vicious discontent. And as this is a remedial disease, the only way to cure it and to keep it cured is to employ a man who is competent to handle the job wisely. While there may be no tangible dividends from this form of investment, no one can deny that it will prove profitable. It has been tried and adopted with success in other industries so it is beyond the experimental stage; and there is no good reason why the coal industry should lag behind.



In the last three months of 1918 the byproduct coke plants attained their maximum capacity. Although they gained only a slight supremacy over the beehive ovens during that period, it is certain that the latter type of oven has seen its best days. The operation described in the following pages is typical of the coke-making facilities found in the modern byproduct coke plant. The illustration at the left shows the screening plant, where coke is separated into different grades.

SOME STRIKING FEATURES of a LARGE BYPRODUCT COKE PLANT*

IN order to supply coke for its blast furnaces at Hubbard, Ohio, the Youngstown Sheet and Tube Co. has increased its coke-making facilities 50 per cent. Since August, 1916, the company has operated four batteries of ovens at its East Youngstown coke plant. Ground was broken for the two new coking units in July, 1917. On Aug. 8, 1918, the first battery was placed in operation, followed by the second on Sept. 4, 1918. These two batteries consist of 51 ovens each. They are of the Koppers cross-regenerative type of 500 cu.ft. capacity.

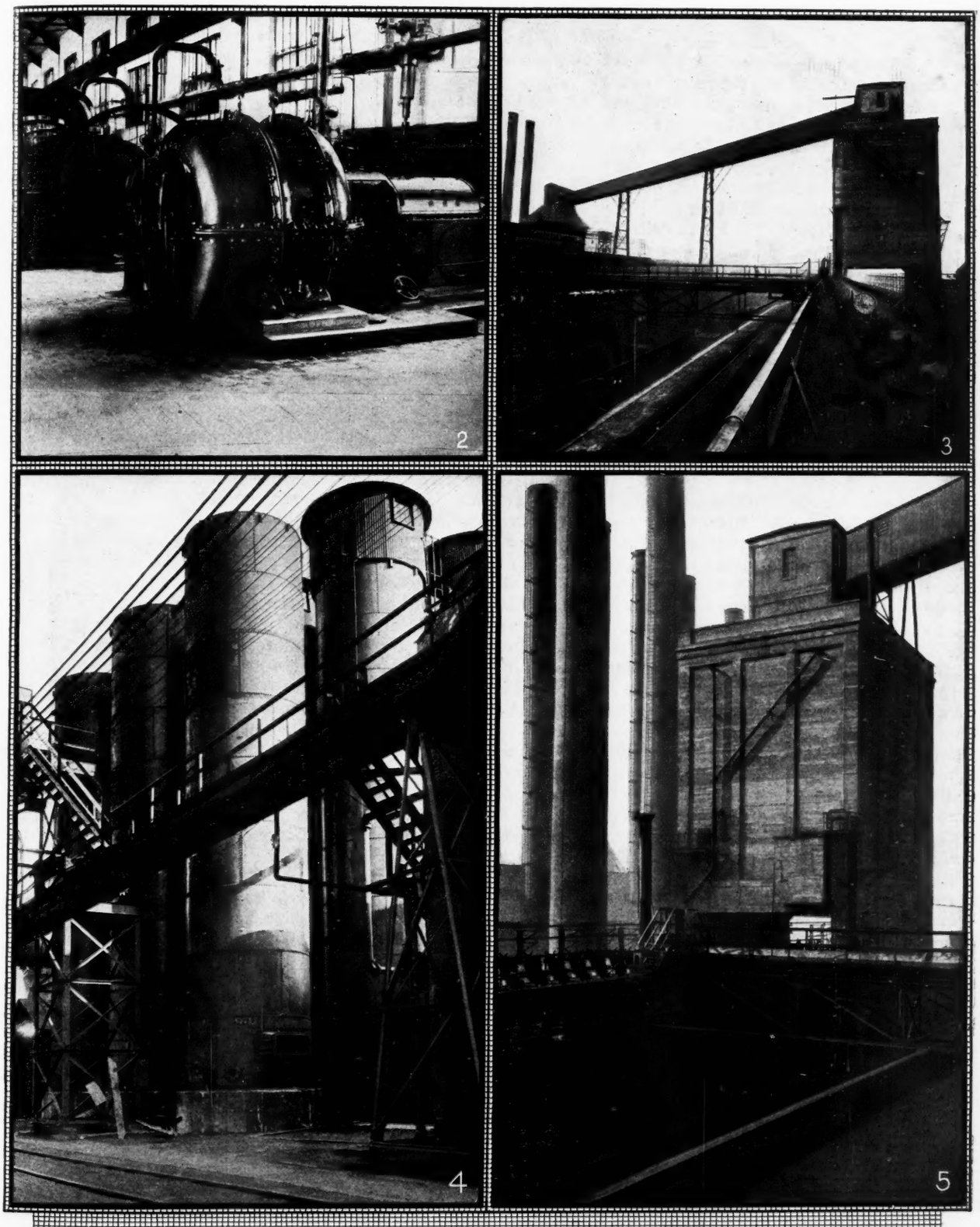
The unloading, crushing and mixing equipment for the original four batteries was designed and installed with sufficient capacity for the extension which was foreseen at that time. The coal is unloaded by means of a high-lift car dumper which is said to be the first one ever installed to serve a coke plant. It was built by the Wellman-Seaver-Morgan Co., of Cleveland, Ohio. A 36-in. belt conveyor, 350-ft. centers, with a capacity of 500 tons an hour, was installed from the top of the storage bin over Nos. 1 and 2 batteries to the new storage bin over the new Nos. 5 and 6 batteries. This bin is of 2000 tons capacity and has a partition so that different mixtures of coal can be handled on the two batteries and also so either side of the bin can be conveniently cleaned without interfering with operations. Clean-out manholes are provided near the top of the hopper in each compartment.

In leveling the coal in the ovens after charging, some coal is often pulled out through the chuck door. Therefore it was decided to incorporate in the new work an arrangement for handling this spillage which had been developed by the Youngstown Sheet and Tube Co. for the old batteries. Accordingly a small bin of about three tons capacity was built on the main bin. The coal pulled from the ovens is dropped through a chute attached to the pusher into a hopper from which it is conveyed, elevated and discharged into the small bin. The operation is designed so that the doorman on the pusher car drops the coal from the hopper and starts the conveyors. The small bin is so arranged that the larry man can empty it without getting off his larry car. This is said to be the first installation of its kind on a byproduct coke plant.

The two larry cars are equipped with a motor-driven swab crane designed by the Youngstown company and are the same as installed by them on the three larry cars on the old batteries. The object in putting a motor on this apparatus was to make the work so easy that the larry men can attend to this duty without extra help.

Owing to the increased coal consumption due to the extension, it was considered advisable to erect a thaw house for taking care of frozen coal. Accordingly a thaw house 400 ft. long was built to hold 20 cars and span two main tracks and the track to the car dumper. The construction is of reinforced precast concrete columns supporting structural steel trusses and the roof and machinery house. The walls between the columns are built up of interlocking hollow tile. The hot-air ducts run the length of the building on both sides between the roof and the bottom chord of the roof trusses: the return air duct is between the hot-air ducts. From the hot-air ducts pipes convey the heated air up under the cars every 5 ft. on both tracks the entire length of the building.

*Reprinted from the Jan. 23, 1919, issue of the *Iron Trade Review*.



Some Views of an Up-to-date Byproduct Coke Plant

Fig. 2—Boosters shown increase the pressure of the coke-oven gas after the byproducts are extracted. Fig. 3—This concrete storage bin is partitioned for each compartment. Fig. 4—Cooling towers near the byproduct building. Fig. 5—Concrete storage bin of 2000 tons capacity. Coke ovens below.

The furnace and machinery houses contain two heating units and fans for delivering and exhausting the hot air. Temperature regulators are provided for automatically controlling the temperature of the air used in the furnaces. Recording pyrometers and thermometers are also installed. Coke-oven gas is used for heating the air. Automatic control is provided for shutting off all the gas except the pilot lights when the fans are shut down accidentally or intentionally. The fans are each designed to deliver 60,000 cu.ft. of air per minute at standard conditions. The air is delivered under the cars at about 225 deg. F., and after passing up along the sides and bottoms of the cars passes into the return air duct through openings in the bottom and on to the heating furnaces. The openings in the bottom of the return air duct are adjustable so that an even distribution of hot air throughout the length of the building is obtained by making the proper adjustments in these openings.

The coke wharf is 125 ft. long and is located at one end of the batteries. Considerable care was given in selecting the location of this wharf so that it would not be in front of the ovens, thereby avoiding the troubles—especially prevalent in cold weather—from steam along the coke side of the batteries. Two locomotives for pulling the quenching car are provided. They were built by the General Electric Co., Schenectady, N. Y. The quencher car track is built with 100-lb. rails and is supported by a reinforced-concrete bed.

From the wharf the coke is conveyed on a 36-in. conveyor, 340-ft. centers, to a new screening station erected for the new batteries. Provision is made by means of a tunnel underneath the quencher track between the wharf and the screening station, so that if in the future the company builds blast furnaces on the coke-plant site a conveyor can be installed to take the coke to a screening station over the blast-furnace trestle and deliver into a transfer car running over the blast-furnace bins. The coke is screened over bar grizzlies, of which there are two; one is reserve equipment and can easily be pulled into position in front of the conveyor when it is desired to remove the bars of the other grizzly.

As a somewhat softer coke is desired in the present operation, special precautions were taken to save breakage of the coke and wear on the chutes from the bar grizzlies to the railroad cars. Coke may easily be delivered into cars on either of two tracks running underneath the screening station. The undersized coke from the bar screens drops onto a 20-in. belt conveyor and is delivered to a revolving screen in which the separation is made into domestic and breeze grades.

Coke, after being screened, is delivered into small bins and from there transported over the river on a trestle to the blast-furnace bins by means of a 35-ton electrically driven transfer car. All chutes are lined with hard brick laid on edge and the sides of the chutes are lined with chilled cast-iron plates. In the new plant glass windows are practically eliminated and steel louvers substituted. Owing to the wharf having been located below the sewer level, an automatic electrically operated bilge pump is installed to take care of drainage water. A car-pulling winch which handles 12 loaded cars and serves both coke-loading tracks is installed to spot empty cars and move away the loaded ones.

A brick quenching hood 58 ft. high is provided. Steel baffles inside of the hood return any coke into the quencher car which may fly into the air during the process of quenching. All concrete foundations for the hood which might come in contact with water from the quencher car are veneered with brick. The same type of solenoid-operated balanced quenching valve, which the company was the first to adopt for this use, is installed in the new quenching station in the same manner as in the old plant.

Except for lowering the horizontal flue 2 in. there is practically no change in the new ovens over the old. In both cases the oven width is 17 and 19½ in., or an average of 18¼ in. wide. It was considered desirable, primarily on account of the men's comfort in hot weather, to insulate the regenerator end walls. Accordingly, the company conducted some exhaustive tests in a specially built furnace, on a variety of insulating materials; finally a moderate-priced grade of infusorial earth was put in between the firebrick and the red brick closing the face of the regenerators. The pusher machines, which were built by the Wellman-Seaver-Morgan Company, are practically the same as on the original installation. The cast-steel end trucks are provided with countershaft bearings on both sides so that the end trucks are interchangeable and but one spare need be carried for both trucks. The ovens, pusher track, walls, coal bins and concrete battery stacks are carried on concrete piles.

The original installation in the byproduct building consisted of three positive-type exhausters delivering through tar extractors and preheaters to three large oval-type saturators, one unit being a spare one. Two positive-type boosters were provided for delivering surplus gas to the mills, one being a reserve. The exhauster and booster fans were built by the Connersville Blower Company of Connersville, Ind. The extension consists of a General Electric turbo exhauster, tar extractor, preheater and saturator and one General Electric turbo booster for the surplus gas. The gas

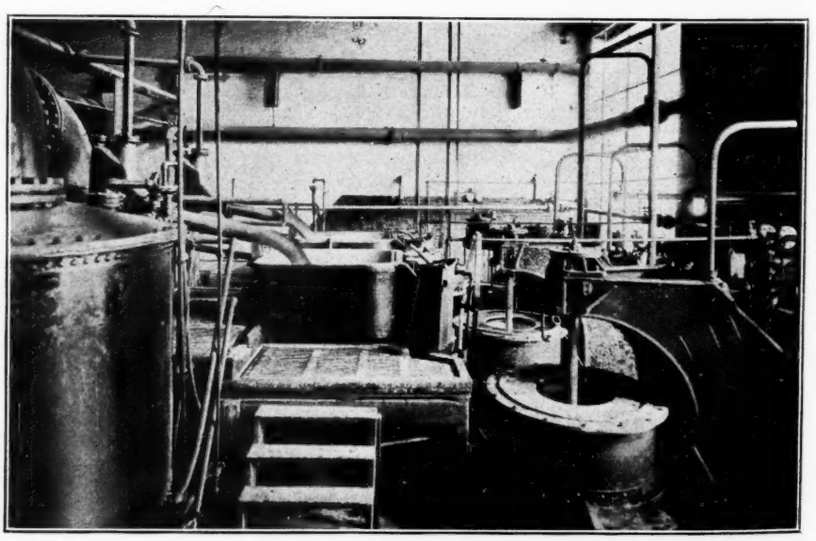


FIG. 6. CENTRIFUGAL WHIRLERS FOR RECLAIMING SULPHATE IN CRYSTALLIZED FORM

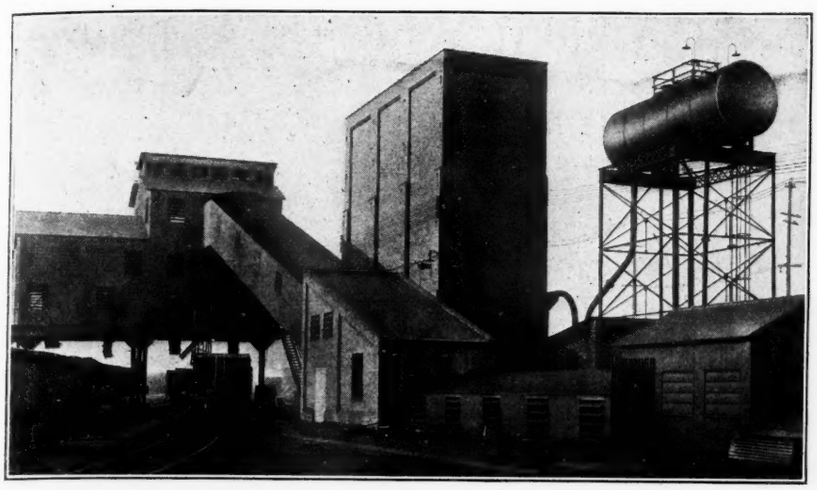


FIG. 7. QUENCHING BUILDING EQUIPPED WITH 58-FOOT HOOD AND PLANT WHERE COKE GOES THROUGH FINAL PROCESS OF MAKING

is admitted to the continuous oval cracker pipe in the new saturator at both ends. This type of saturator was adopted in preference to the type originally built, in which the gas was all admitted at one end into two separate cracker pipes.

The regulation of the gas in the collecting main is accomplished by the turbo exhauster and governors on the offtakes, the other exhausters being run at constant speed. Two new primary coolers, a storage tank for weak liquors and an ammonia still were added.

The Youngstown Sheet and Tube Co. designed and built a jib crane operating a one-half yard, single-line, grab bucket for cleaning out accumulations in the hot-drain and flushing tank. This bucket, which was furnished by Edgar E. Brosius, of Pittsburgh, Penn., empties into a small dump car running on a narrow-gage track. The car delivers the material to a pit within reach of a standard railroad track where it can be gathered by a locomotive crane. By this device men are never required to enter the hot-drain or flushing tanks to clean out accumulations. An interesting feature of this tank which was designed by the company is the absolute and simple control of the proportions of tar and liquor for flushing purposes. The mixture is ordinarily carried at 50 per cent. each, but can be varied almost instantly by a valve to any desired proportion of tar and liquor. By means of this and other control features the primary coolers, which ordinarily have to be steamed out every few days, are run from four to six weeks at a time without such attention, which effects considerable saving of steam, labor and deterioration, due to expansion and contraction of the large number of tubes in these coolers.

In the sulphate storage room is a hopper, with a chute extending through the wall, whereby bulk shipments can be made by means of the overhead crane loading into the hopper; the salt runs directly into the box car instead of having to be wheeled into the car by hand. A loading hopper for bag shipments is also built. Sulphate of ammonia often cakes more or less while in storage, and when loading into bags through the usual hopper it is necessary to have a man on top of the hoppers to push the salt down. By means of a special design of toothed rolls the salt is fed into the bags without any hand labor.

The original benzol plant and the addition were built by the Semet-Solvay Co. The latter consists of two light-oil stills and one refining still, also auxiliary apparatus, wash-oil coolers, gas coolers and gas scrubbers. A new acid washer building was erected entirely separate from the main benzol building and so arranged that all apparatus can readily be taken down and removed from the building for any repairs which might be dangerous in this location. Overhead hand-operated traveling cranes are installed in both the main benzol building and the acid washer building. All new work rests on concrete piles, as was the case with the original work. In constructing the additions particular care had to be exercised on account of the hazards of the industry. The concrete pile driver was furnished steam through a hose to avoid the use of the boiler. All field work on the structural steel was bolted, no riveting being permitted on the site.

One new Babcock & Wilcox boiler was installed with Coxe traveling chain-grate stokers, with which the entire boiler house is equipped. Coke breeze produced at the coke plant is used for fuel. Gas burners are installed for emergency use only or for use Saturday night or Sunday in case the surplus gas would otherwise be wasted.

The three Wheeler forced-draft cooling towers originally installed were made large enough to take care of the extension. It is necessary in summer to use two of these towers for cooling the river water for use in the primary coolers and the first section of the wash-oil coolers. The third tower is used for recirculating water for the first cooling of the gas leaving the byproduct building and is a closed system. Cold water from a nearby reservoir is used for apparatus inside the benzol building, final cooling of the gas before the benzol scrubbers and final cooling of the wash oil, but this is reduced to a minimum by cooling as far as possible with the cooling-tower water as a preliminary step.

Coal and Phosphate in Southeastern Idaho and Western Wyoming

Coal has been mined in a small way in the Bighole Mountains, Teton County, Idaho, for many years, to supply the local demand. The coal is of excellent quality and the chief drawback to its wider use has been the remoteness of the mines from the railroad. During the war the greatly increased demand for fuel led to an increase of interest in this field, and late in 1918 preparations were being made to build a railroad spur to the mines from the Teton Valley Branch of the Oregon Short Line Railroad. When this track is completed Idaho may rank higher as a producer of coal.

The United States Geological Survey, Department of the Interior, has recently issued, as Bulletin 680, a report by A. R. Schultz, which describes the coal fields of the Bighole Mountains and other districts in this part of Idaho and the adjacent part of Wyoming. The report also describes extensive phosphate deposits in the same general region. The existence of these deposits has been known for more than 10 years, but their extent was not known until they were mapped in detail and sampled by Mr. Schultz.

Selection of the Electrical System, Voltage and Frequency for Mine Service

By Terrell Croft
University City, St. Louis, Mo.
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SYNOPSIS—*For direct-current distribution a voltage of 250 is practically a standard at American coal mines. Some installations have been and still are made at 500 volts, but such a potential should be avoided where possible. In alternating-current distribution a frequency of 60 cycles is usually adopted, although some plants operate at 25. Alternating-current voltages range from 110 upward.*

WHETHER direct or alternating current should be used in a mine must be determined by local conditions. If mining locomotives are to be operated, the use of direct current is almost imperative. For a mining property of any considerable extent, high-voltage alternating-current transmission and low-voltage direct-current distribution are usually the most economical and satisfactory course to follow. If energy is to be transmitted for over, say, four or five miles, high-voltage alternating current is ordinarily the only logical solution on the basis of sound economics; 2200 volts can be used for distances of possibly up to four miles, although it is probable that 6600 or even 13,000 volts may be more desirable, particularly if there is a possibility of the system being extended to greater distances in the future. Where power purchased from a public utility company is to be utilized, this will, in practically every case, be alternating current. Substations and transmission system will be designed accordingly.

TABLE I. PROPORTION OF MINING LOCOMOTIVES OF DIFFERENT TYPES IN MINES IN THE UNITED STATES

(The data for this table were furnished by two of the largest manufacturers of electric mining locomotives)

	Coal Mines		Metal Mines	
	Manufacturer A	Manufacturer B	Manufacturer A	Manufacturer B
Type of Locomotive	Per Cent.	Per Cent.	Per Cent.	Per Cent.
500-volt, direct current	8	15	10	20
250-volt direct current	67	70	64	70
Storage battery	25	15	26	10.
Three-phase and single-phase, alternating current	0	0	0	0

Concerning whether single-phase, two-phase or three-phase alternating current should be used, it may be stated that the three-phase system only is used in modern installations. This is because this system is much more satisfactory and economical for the majority of installations than is either the single-phase or the two-phase. Two-phase equipment is seldom if ever installed now except as additions to existing two-phase installations. Single-phase equipment is never used except for electric lighting and where the power requirements are exceedingly small. The three-phase system requires only 75 per cent. of the copper of an equivalent two-phase or single-phase system and necessitates only three wires as against the four ordinarily used with the two-phase system.

The standard frequency for alternating-current power transmission and distribution may now be stated to be 60 cycles. It appears that it is desirable in practically every case to adopt this rather than any other frequency. The economies and advantages which were expected to result from the use of 25 cycles for electrical energy transmission have not, in general, materialized. A number of plants which generate at 25 cycles have been constructed, which necessitates the installation of 25 to 60 cycle frequency changers where 60 cycles is the utilization frequency.

Voltages used in mines may be classified into (a) low pressure, (b) medium pressure and (c) high pressure. These terms are defined by "Standardization of Electrical Practice in Mines," Circular No. 23, Bureau of Standards, as follows:

A low-pressure system is one where the conditions are such that the pressure between any two conductors or between any conductor and the earth, at the terminals where electricity is being used, cannot exceed 300 volts.

A medium-pressure system is one where the conditions are such that the pressure between any two conductors or between any conductor and the earth, at the terminals where electricity is being used, can exceed 300 volts but cannot exceed 600 volts.

A high-pressure system is one where the conditions are such that the pressure between any two conductors or between any conductor and the earth, at the terminals where electricity is being used, can exceed 600 volts.

The power lost in an electrical circuit transmitting a given load varies inversely as the square of the impressed voltage. This is strictly true if certain factors which affect only very high voltage alternating-current lines are disregarded. If the voltage impressed on a line is doubled, the watts of line loss (a certain amount of power being transmitted) will be quartered. If the impressed voltage is trebled, the loss will be one-ninth of that with the original voltage. The truth of these statements may readily be verified by applying Ohm's law to hypothetical cases. This explains why a high voltage is, from the line loss standpoint, desirable for electrical energy transmission.

The weight of conductor is, for a given loss, inversely proportional to the square of the impressed voltage. That this is true follows from the statement of the preceding paragraph.

The proper voltage for the distribution of electrical energy in and around a mine must be determined by the requirements and conditions affecting each installation. Formerly, 500 volts was the standard pressure but because of the life and fire hazard which this potential involves it has been superseded by a lower one. In mines where electric locomotives are operated, direct current at a pressure ranging from 220 to 275 volts is preferably used. Some mines in West Virginia (Ohio Brass Co.) operate a three-wire system at 500 volts between outside wires and 250 volts between outside and neutral.

A generally accepted rule is to limit the range of distribution for 250 volts to one mile and for 500 volts to four miles. However, it is frequently necessary to carry electric power at 250 volts into mines for greater distances than one mile. This necessitates a correspondingly greater investment for feeder copper. Pressures exceeding 300 volts are usually fatal to life, particularly

TABLE II. VOLTAGES ADVISABLE FOR LINES OF VARIOUS LENGTHS IN THREE-PHASE TRANSMISSION (GENERAL ELECTRIC CO.)

Length of Line	Voltage
Up to 1 mile	500 to 1,000
1 to 2	1,000 to 2,300
2 to 3	2,300 to 6,600
3 to 10	6,600 to 13,200
10 to 15	13,200 to 22,000
15 to 20	22,000 to 33,000

so under the conditions of dampness often occurring in mines; hence these are undesirable for mine traction service.

Where a haulage system extending for a considerable distance is to be installed, it is desirable to locate underground substations so as to minimize the direct-current transmission distance so that 250 volts can be used economically. In such substations synchronous converters or motor-generators can be installed whereby high-voltage alternating current can be converted to low-voltage direct current. A 125- to 250-volt direct-current three-wire system is often desirable.

For alternating-current distribution to medium capacity motors 220 volts is usually the preferable pressure. Large motors may be served economically with 2200 or even a higher voltage.

About 1000 volts per mile for alternating-current long-distance transmission (H. B. Gear) is a rule of thumb which serves as an index. This is based on the fact that with copper conductors and a pressure of 1000 volts per mile with a current density of one ampere per 1000 circ. mil the energy loss will be about 10 per cent. That is, a line designed on this basis will carry its current without excessive heating and at about 10 per cent. loss. For relatively short lines transmitting considerable power the rule provides a conductor too small for most economical operation—that is, for minimum

TABLE III. SIZES OF WIRE FOR THREE-PHASE TRANSMISSION SERVICE

Approximate distances over which 100 kw., three-phase current, can be transmitted with different sizes of wires at different voltages, assuming an energy loss of 10 per cent. and a power factor of 85 per cent.

No. B. & S.	Area in Circular Mils	Voltage of Line — Distance of Transmission of Various Potentials at Receiving End, in Miles								
		2000	3000	4000	5000	6000	8000	10,000	12,000	15,000
6	26,250	1.32	2.98	5.28	8.27	11.92	21.12	33.1	47.68	74.50
5	33,100	1.66	3.75	6.64	10.40	15.00	26.56	41.6	60.00	93.75
4	41,740	2.10	4.74	8.40	13.15	18.96	33.60	52.6	75.84	118.50
3	52,630	2.54	5.96	10.16	16.55	23.84	40.64	66.2	95.36	149.00
2	66,370	3.33	7.51	13.32	20.85	30.04	53.28	83.4	120.16	187.75
1	83,690	4.21	9.48	16.84	26.32	37.92	67.36	10.53	151.68	212.00
0	105,500	5.29	11.92	21.16	33.10	47.68	84.64	132.4	191.72	298.00
00	133,100	6.71	15.11	26.84	41.97	60.44	107.36	167.9	241.76	377.75
000	167,800	8.45	19.04	33.80	52.85	76.16	135.20	211.4	304.64	476.00
0000	211,600	10.62	23.92	42.48	66.42	95.68	169.92	265.7	382.72	598 00

nual costs. Hence, for the short-distance transmission of much power a pressure greater than 1000 volts per mile may be more economical. Where a transmission system serves an extensive distance and the load is small, a voltage smaller than "1000 per mile" may sometimes be adopted with economy.

Example—What size wire should be used to deliver 100 kw. at 6000 volts, at the end of a three-phase line 12 miles long, allowing an energy loss of 10 per cent. and a power factor of 85 per cent.? Solution—If the example called for the transmission of 100 kw. (on which Table III is based), look in the 6000-volt column for the nearest figure to the given distance, and take the size wire corresponding. But the example calls for the transmission of five times this amount of power, and the size of wire varies directly as the distance, which in this case is 12 miles. Therefore, look for the product $5 \times 12 = 60$ in the 6000-volt column of the table. The nearest value is 60.44 and the size wire corresponding is No. 00, which is therefore the size capable of transmitting 100 kw. over a line 60.44 miles long, or 500 kw. over a line 12 miles long.

If it is desired to ascertain the size wire that will give an energy loss of 5 per cent., or one-half the loss for which Table III is computed, it is only necessary to multiply the value obtained by 2, for the diameter varies directly as the per cent. of energy loss.

Do British Miners Shirk Tax Payment?

BY AN ENGLISH COLLIER

The coal scarcity in Britain has become a serious problem. To a large extent the existing situation has been brought about by Bolshevism, and the remedy must be patriotism to a similar extent. The miners' leaders are appealing for support from their men. Only a little time back, however, they would not hear anything of the suspension of the Eight Hours Act, although at the time it was going through the various stages of enactment they allowed a section to read that in the case of emergency the act could be suspended.

If Great Britain is not in a national emergency at present, I do not know, and dare not think, what conditions will be like when it is. But the miners will not even give way to let the 60 hours per year extra be worked. Apparently some men will not work as it is, but there are quite a number who would put in extra time for the sake of the country if allowed to do so. Such men, of course, find other work of national importance to do, such as gardening, etc. The most recent figures show that in 1917 there were 7,875,232 tons less coal turned out than was produced in 1916, in spite of the fact that 23,277 persons more were employed. There was an increased output in the Yorkshire and North Midland district, but there were here 244,329 persons employed against 239,331 in 1916.

Considering the output per man in 1916, there ought to have been turned out 300,000 tons more in 1917. The actual figures for the districts named were:

1917	69,128,836 tons
1916	68,005,505 tons

Only three districts in the country had an increased output in 1917 over 1916.

This side of the question then must be absenteeism. What is the cause therefor? There may be many causes, but the one that could most easily be removed is the income tax. This is undoubtedly the cause of much absenteeism. It is next to an impossibility to get some men to make any overtime if their ordinary six days bring them anywhere near being taxed. Scores who used to work well would rather take holidays than pay out any portion of their wage in income tax, even if their income is made considerably less through this.

Bumps and Outbursts of Gas in the Crowsnest Pass Coal Field*

THE Crowsnest Pass coal field is located in the extreme southeastern corner of British Columbia only a few miles removed from the northern boundary line of the United States. It is regarded as the most important coal field in the province. The field presents unusual natural difficulties to mining as the coal beds are at the base of an elevated plateau; the coal is under heavy cover requiring great care in mining to avoid squeezes and "bumps," and it practically can only be reached through the outcrop.

This coal field is in the form of an elevated trough, narrow at the north end and wide at the south, the southern part broadening toward the southeast (Fig. 1). The extreme length north and south is 35 miles and the greatest width along the southern half, a little south of Coal Creek, is 13 miles. The field covers 230 square miles and is estimated to contain in seams over 1 ft. thick, 22½ billion tons of bituminous coal in actual reserve, 20¾ billion tons in probable reserve and two billion tons, in beds 2 ft. thick and over at depths greater than 4000 ft. and less than 6000 ft., which might be expressed as possible reserves—or a total of over 45 billion tons. A number of the seams are too thin and too impure to mine with commercial success at the present time; it is considered that the available coal does not have an aggregate thickness—in beds 3 ft. or more thick—of more than 100 ft. Furthermore, some of the thickest beds, 10 to 20 ft. thick, owing to friability of the coal and poor roof, cannot under present conditions be cleanly mined out, and there is in consequence much loss of coal.

The Crowsnest basin has been buckled into a north and south synclinal trough by the great dynamic forces pressing from either side in the uplifting of the Rocky Mountain ranges. As a consequence, around the edges of the basin the beds have been steeply uplifted. While the more rigid sandstones and conglomerates overlying the more important coal seams have protected the latter, there is abundant evidence of disturbance, including a lateral squeezing of the coal to increased thickness in which it was badly crushed in places. Also there has been some local faulting of the coal beds, which causes much difficulty in mining operations. The dips of the coal beds from the edges of the basin probably carry the lowest beds down, in the middle of the trough, to such depths that under the highest ridges there is from 3500 to 5000 ft. of cover over the lowest beds. The accompanying cross-sections, Figs. 3 and 4, referred to the mine map, Fig. 2, for location, indicate the direction and amount of dip of the beds at the Coal Creek colliery.

The coal beds in any one locality are well defined, but it seems to be difficult to correlate the beds in the different sections as the beds change their characteristics and the adjacent rocks are said to lack distinctive features. The coals in the different beds that have been worked at Coal Creek, Hosmer and Michel do not differ much in chemical composition and are coking coals; but the coal at Morrissey had evidently been subjected to more intense crushing and the percentage of fixed carbon is higher. The Crowsnest field produces a good grade of bituminous coal, the different beds in any one locality having about the same kind of coal. Except at Morrissey, where the fixed carbon is too high to permit of making coke in beehive ovens, the coal makes a good

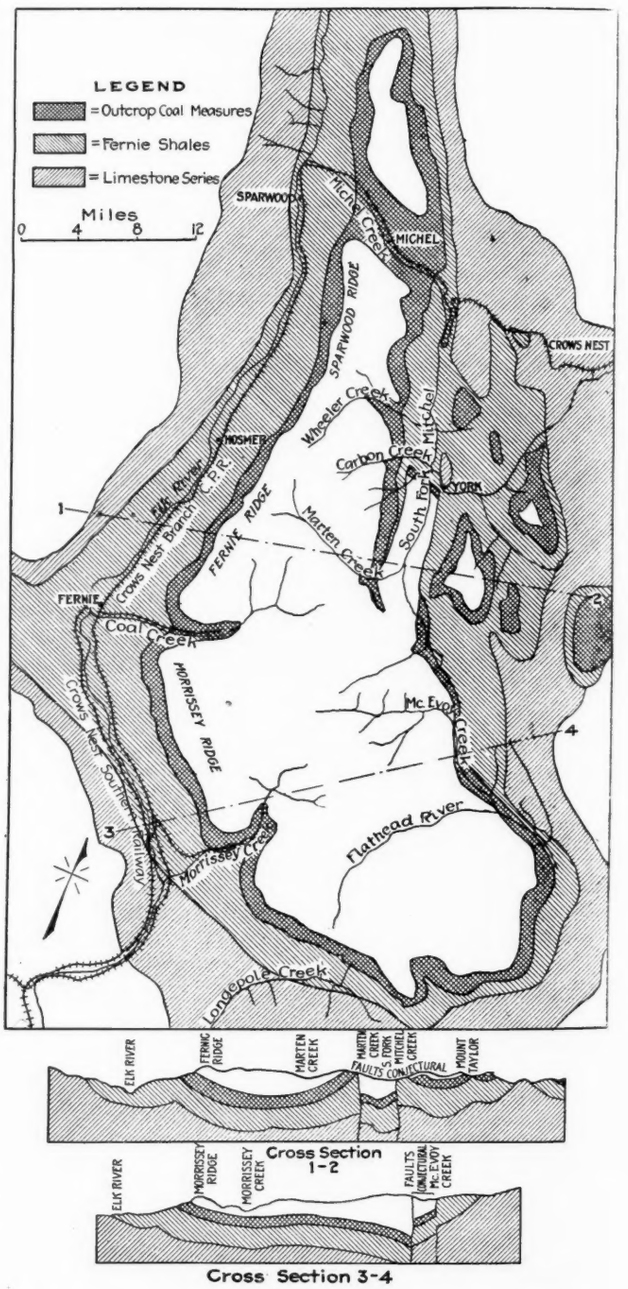


FIG. 1. CROWSNEST PASS COAL FIELDS IN BRITISH COLUMBIA, CANADA

*A digest of Bulletin No. 2, 1918 (British Columbia Department of Mines), on "Bumps and Outbursts of Gas in the Mines of Crowsnest Pass Coalfield"—a report by George S. Rice, E.M., chief mining engineer, U. S. Bureau of Mines.

metallurgical coke. There are 440 ovens at Fernie, coking Coal Creek coal, and 480 at Michel.

In this article the principal interest centers on the beds at the Coal Creek operations. Six seams have been prospected here, but of these only Nos. 1 and 2 have been found to be commercially minable at present. Normally these beds are from 75 to 150 ft. apart, but in certain parts of the Coal Creek mines the beds come together. The following are typical sections of these beds:

SECTION NO. 2 BED

Roof, Strong Shale (in Places Sand, Shales and Sandstone)

Coal	3 ft. 6 in. to 8 ft. 0 in.
Rock with streaks of coal	1 ft. 8 in.
Coal, high in ash (gaseous)	1 ft. 4 in.
Floor, shale	

SECTION NO. 1 BED

(75 to 150 ft. Above No. 2 Bed)

Main roof, massive shale and sandy shale	
Roof coal clean, friable	2 ft. 6 in. to 3 ft.
Rash, slickensided shale with coaly layers	1 ft. to 4 ft.
Coal, columnar structure, soft, clean	9 ft. to 13 ft.
Floor, shale (strong)	

ANALYSIS FACE SECTION SAMPLES, COAL CREEK MINES

Coal Creek Mine	Location in Mine	Moisture	Volatile	Fixed Carbon	Ash	Sulphur	B.t.u.
No. 1 east....	Face, No. 10 east.	0.50	23.25	63.60	12.65	0.31	13,529
No. 1 east....	Face No. 1 north.	0.50	21.35	65.05	13.10	0.34	13,462
No. 3.....	Face main level....	0.70	24.05	66.05	9.20	0.57	14,081

The Crowsnest coal mines have the unenviable position of being among the most gaseous mines in the world, according to records of analyses of mine-air samples through the British Columbia Mining Department. In No. 1 East mine of the Coal Creek collieries on Apr. 14, 1916, when the mine was working, 2906 cu.ft. per minute of methane was given off. This quantity represents the maximum discharge from any of the mines in the field according to the records. At this rate there was thrown out of the mine in 24 hours 4,184,600 cu.ft. of methane, which would weigh 78 tons. The production of coal was then about 1500 tons, or about 2790 cu.ft. of methane for each ton of coal mined. It was thought that the greater part of this flow came from the coal stratum rather than that it was liberated from the breaking down of the coal in mining.

As illustrating the great outbursts of gas which take place in this field, a remarkable case is cited which occurred at the Carbonado mines of the Crowsnest Pass Coal Co. These mines were opened up on Morrissey Creek, about seven miles south of Coal Creek. In 1903, when the main entry had been driven in 2000 ft. from the outcrop, a great outburst of gas occurred in which it was stated that over 1400 tons of coal was blown out of the face of the main entry. In 1904 there was another great outburst in which 14 men were killed, the coal thrown out filling the entry for 400 ft. according to the inspectors of the district. The displacement of coal in this instance was estimated by the management to amount to 3500 tons. The volume of gas given off in the last 30 minutes after the outburst was estimated by various authorities at from two to five million cubic feet. No such great instantaneous outbursts have occurred in mines other than the Carbonado, but lesser, slower outbursts have taken place in the Coal Creek mines. In some virgin areas of this latter mine, when entries have been advancing on three shifts, it has been found necessary to slow the advance, on account of gas given off, by cutting out one or two of the shifts.

Methane outbursts into coal mines have not been uncommon in many coal fields besides the Crowsnest, but such outbursts have occurred only when the coal bed being mined is deeply covered to a depth of over 1000 ft. or more by strata containing impervious shales. Methane found in coal measures is generally believed to have been derived from partial distillation of the bituminous matter in the coal seams and bituminous shales, in the natural process of coal formation by chemical reactions aided by heat and pressure from deep burying and mountain upbuilding. It is therefore believed that all coal beds have produced large amounts of hydrocarbon gases; where the beds are thinly covered or are covered only by previous rocks like sandstone, or the cover is much broken by fault planes extending to the surface, then the gas has escaped. Generally, the more deeply buried the coal beds, the further advanced is the coal from the lignitic stage; also the larger will be the volumes of the residual gas—methane—contained in the strata, and furthermore the greater the pressure under which the gases are confined. In Great Britain, in deep boreholes from the surface to the coal beds, the pressure of gas attained 500 lb. and at Belgian mines 657 lb. per square inch. Great outbursts of methane (chiefly) have occurred in the deep Belgian mines, in one of which many years ago about 140 men were smothered, the gas taking fire at the surface and burning for a day or two. Several hundred other outbursts have occurred in Belgian mines, causing many deaths of miners; being accompanied by the dislodgment of quantities of coal blown out in large part as dust. The great outbursts of methane which occurred on several occasions in the Morrissey mines in the Crowsnest coal field have been unparalleled except by the Belgian outbursts.

One method of protecting men from gas outbursts is to keep boreholes in advance. This is the method practiced in many mining districts of the world, but hitherto it has been argued that it would not permit the advance discovery of a stored pocket of gas such as was encountered by the Carbonado mines. It is Mr. Rice's judgment that if a sufficient number of boreholes be drilled, spreading fan-shaped from the main advance entries, that these would approach near enough to such a pocket of gas and crushed coal to show by the gas flow from the pipe that there was a dangerous area ahead; until this area had been drained by other boreholes, then the entry or room which developed the gaseous territory should be stopped. The matter of gas flows and outbursts, although not so immediately acute in the operation of the Coal Creek mines as that of "bumps," yet is a most serious and vital consideration in planning for future operations in the mines of the Crowsnest field.

While the consequences of the outbursts of gas in the Crowsnest coal field have been most serious, still the "bumps" common to this section have occasioned far more alarm and the destruction of property due to this cause has been greater; it was due to fortunate circumstances that serious loss of life did not attend the most serious "bump," which occurred at a time when the miners were not in the Coal Creek mine. "Bumps" are not related to gas outbursts but they may occur, as in the State of Washington and in Great Britain, where the overlying rocks are rigid and there is great weight of cover; coupled with these conditions may be incor-

rect mining in which too much coal has been extracted in advance and the robbing of pillars has not been conducted so as to bring about proper breaks in the overlying rock. They are believed to be caused by the subsidence of the roof directly over the coal in certain areas under rigid rocks, leaving a great unsupported span of rock stratum. In time this inflexible layer of rock gives way and there is profound rock movement resulting in earth vibrations—on a sufficiently large scale it would be called an earthquake. When one of these extensive movements takes place it means a blow of thousands of tons of rock on the immediate roof of the mine, breaking timber, causing extensive falls in the mine and sending rock tremors through the strata. The history of the Coal Creek mines of the Crowsnest Pass Coal Co. shows several periods during which "bumps" predominated. During the years 1906 and 1908 a series of "bumps" occurred in the No. 2 mine at Coal Creek. In January, 1907, the first loss of life took place here through this cause; after that other "bumps" occurred of increasing intensity until in July, 1908, four men were killed and 20 others, temporarily entombed, narrowly escaped suffocation from gas. No similar disaster took place at these mines until the nights of Nov. 7 and 8, 1916, when three bumps occurred, the first two somewhat local in effect but the third of tremendous force which broke down timber and shook down falls of roof through a large part of the active mine workings. It caused earth tremors which were felt for miles, not only in Fernie, five miles away, but also in other towns to the north and south of Fernie. In spite of the intensity of the "bumps" only one man was killed and that death resulted from the second disaster. Several men were badly bruised in the third great "bump," and some of the escapes of the men in the mine were almost miraculous on account of the great area of roof which had fallen. Had this great "bump" occurred during the day shift, the loss of life must have been great, as areas in the rooms and entries through the most active working section, aggregating thousands of feet in length, were heavily caved. A fourth, milder and more local "bump" occurred on No. 13, 1916, and one of considerable severity on Jan. 12, 1917.

As a result of the "bumps" of November, 1916, a thorough investigation of the whole matter was undertaken and a report made by Mr. Rice, of the United States Bureau of Mines. A better understanding of the situation at the Coal Creek mines can be obtained from a brief description of the workings and referring to the mine map, Fig. 2, and sections Figs. 3 and 4. The No. 2 seam at Coal Creek was opened first and mined extensively in the old No. 2 and No. 3 mines on the south side of the creek. The coal varied in thickness from 4½ ft. on the dip or east side of No. 3 mine to 11 ft. on the west side of No. 2 south. On the west side there is a crumpled zone in which the coal in places is 20 ft. or more thick, but it is crushed and dirty. Throughout the inner central portion of the No. 2 mine, affected by "bumps" and now closed off, the coal is said to have been 4½ to 5 ft. thick. The general method of mining in the Nos. 2 and 3 mines was by the pillar-and-stall system, the stalls or rooms being turned off water-level entries which were driven from inclines. The entries were 12 ft. wide and the rooms 16 to 20 ft. wide with a 40-ft. pillar. The workings were extremely irregular. In some places longwall mining was

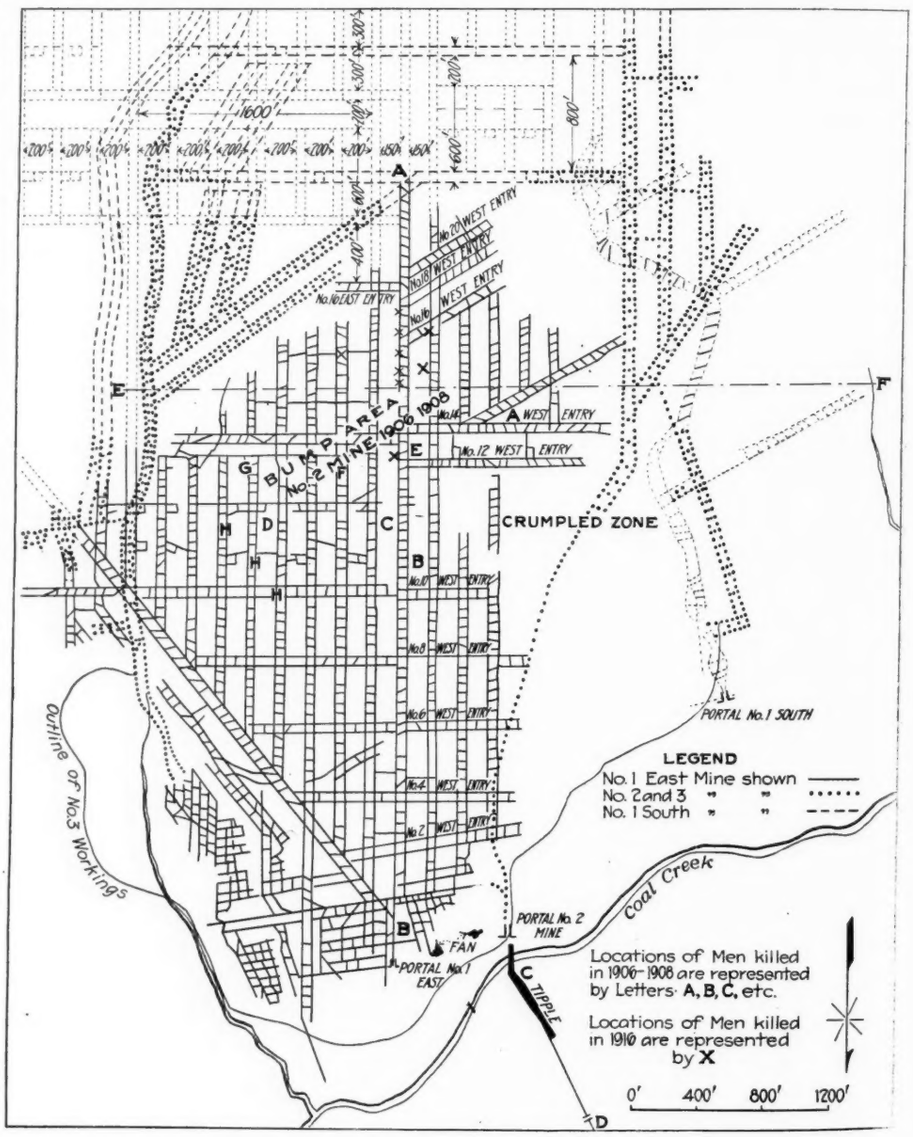


FIG. 2. MINE MAP OF COAL CREEK COLLIERY, CROWSNEST PASS COAL COMPANY

started in irregular panels; in other places the pillars were withdrawn. In the "bump" area 50 to 60 per cent. of the coal had been mined out; this correspondingly increased the load on the pillars, which bore the weight of 2000 ft. of cover. This area of disturbance includes a section of about 1000 x 1500 ft., or a territory of some 35 acres in extent. Following the shutting up of this "bump" area in No. 2 south mine, the work in this seam was continued only in the east and west portions. In these later developments, large 150-ft. pillars were left between each pair of rooms; between the two rooms comprising the pair there was a 50-ft. pillar.

The No. 1 seam overlying these old workings runs from 9 to 12 ft. thick; it was developed over the west part of old No. 2 mine by what is termed the No. 1 south mine; subsequently No. 1 east mine was developed over the central part of old No. 2 mine. The No. 1 east mine was the only mine systematically planned of all the Coal Creek workings, and the advance plan was rigidly adhered to. The main entries run due south,

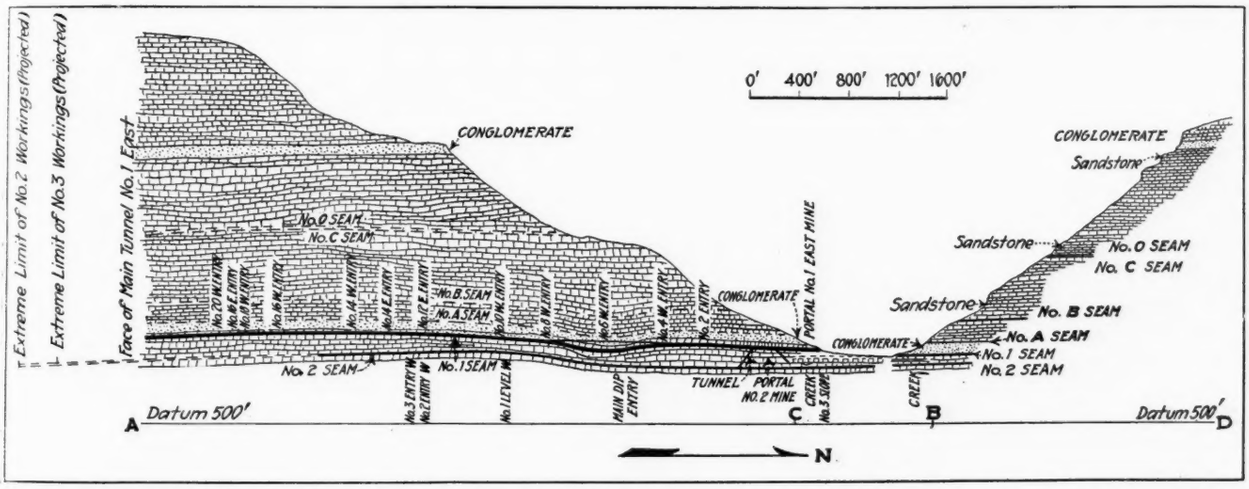


FIG. 3. GEOLOGICAL SECTIONS AT COAL CREEK COLLIERY. SECTION A-B ON LINE OF NO. 1 EAST ENTRY. SECTION C-D SHOWS GEOLOGICAL FORMATION ON THE NORTH SIDE OF COAL CREEK

which is approximately on the strike of the bed; the pairs of cross entries were turned off the main every 600 ft. at the start and in the inner part of the mine every 1000 ft.; there is a 60-ft. pillar between each entry of the pair. Rooms only 14 ft. wide are also driven in pairs and parallel to the main entries; each one of the pair is 60 ft. apart. There is a 150-ft. pillar between each pair of rooms. Only 25 per cent. of the coal was taken out by this method on the advance and no pillars were to be drawn until the mine was retreating as a whole. The method of timbering the rooms in these workings is shown in Fig. 5.

The No. 1 east mine developed rapidly; the mining conditions were good except the immediate top, consisting of the rash and soft coal, which after a time was allowed to fall. The timbering was then carried up to the main roof. The mine passed over the "bump" area of old No. 2 mine without noticeable effect; by November, 1916, the rooms to the east of the main entries were 300 to 400 ft. beyond the abandoned No. 2 mine, and the main entries were about 700 ft. in advance of the No. 2 mine workings or some 5000 ft. from the mine mouth. These were the conditions which prevailed on Nov. 7 and 8, 1916, when the "bumps" occurred which were recorded earlier in the report, and which led to the investigation noted. As already implied, "bumps" are manifestations of pressure and occur only when the mines are at great depth, usually exceeding 1000 ft. If these overlying measures are soft and pliable, such as shale beds, "bumps" will not occur. "Bumps" only take place when there are beds of massive and rigid rock of great thickness above, such as strata of sandstone, conglomerate and limestone.

In commenting further and more in detail on the cause of "bumps," Mr. Rice stated that when an area in a coal bed has been mined out or when a squeeze has occurred so that a subsidence or separation of the immediately overlying softer rocks from the upper rigid rocks has occurred, then the massive stratum will span the subsidence. If the diameter of this subsided area is small, a strong stratum would easily be self-supporting; but if the subsidence of the lower measures was several hundred or a thousand feet in diameter, so that the under side of the massive rock was not supported over this space, then it is improbable that such conditions would continue. In time the massive rock, bearing the weight of the mountain, would fall, giving a blow of tremendous force and produce the effect called a "bump." The larger and heavier the stratum the greater would be the "bump." Above such a great fallen slab there would in all probability be almost the same depth of space as was represented by the subsidence, and there would be a flat dome-like arch as before. After one rigid stratum has given way in the interior of the measures there is opportunity for similar giving way of successively higher strata with less and less effect on the mine workings as the spaces become more or less filled with broken rock and the blow cushioned, also as the vertical distance above the workings becomes greater with each successive fall. If the subsidence of the lower measures continued through enlargement of the area of mining or of squeeze, then the second "bump" might be more serious than the first. In the case of the Coal Creek workings such aggravated conditions may have been brought about by the opening of the overlying or No. 1 seam.

The direct blow of the "bump" on the mine roof may

break timbers, throw down great amounts of soft roof material and cause slabbing of all the coal; or where the coal is strong and the floor weak there may be a sudden heaving or uplifting of the floor. The latter effect was the chief characteristic of the "bumps" which occurred in No. 2 mine from 1906 to 1908, whereas in the recent "bumps" in the upper bed of No. 1 mine the chief manifestation was through the breaking of timber and the release of the soft rash and coal above it. The great danger to the workmen is in being buried by the material, which in the case of No. 1 mine lies above the usual timbering, or from the sudden thrusting up of the floor against the roof or side as was the case in No. 2 mine. In the latter mine the giving off of large amounts of gas was an additional danger. Another secondary but dangerous condition for the men in the area affected was in the greater No. 1 mine "bumps" recently, due to falls of roof which suddenly checked the air current. This sudden arrest of a large volume of air caused the bursting in of many wood stoppings and brought about a momentary pressure which hurled the men in its path in reverse direction to the former current.

"Bumps" are known in other coal-mining districts of the world. They have been a serious menace in a certain South Staffordshire coal mine in Great Britain working the "10-yard" seam, which is 24 to 30 ft. thick. This mine is worked by a square chamber system and, the pillars being quite high, there is probably a subsidence of the immediate roof, opening an equivalent space at some unknown distance above. The strong massive strata higher up which are no longer able to span such areas of subsidence break and cause "bumps." In these mines in such cases the timber is broken down, the coal slabs off and accidents result to the miners. The South Staffordshire workings are 1500 ft. or more below the surface. "Bumps" in coal mines are known in various coal-mining districts of the world and are akin to air blasts in metal mines, which are of such serious account in the deep mines of the Rand and in the Lake Superior copper district.

From the evidence obtained in the investigation leading up to this report the following conclusions are noted: It is believed that had the massive rock strata, found in the rock overlying the coal seams, been frequently broken in mining (in No. 2 mine) from the outcrop then "bumps" would not have occurred. One piece of supporting evidence for this belief is that on the north side of Coal Creek, where the coal is mined by longwall, the cover was broken over the mine for a height of 1200 ft. vertically without causing any "bump" effects.

It is also believed that if the advance mining had been as systematic in the first mines opened up in the lower seam as at present, and coal had not been removed to exceed 25 per cent., then the weight thrown on the pillars would not have been great enough to have caused their being crushed into the floor and probably the "bumps" of 1907-8 would not have occurred. Furthermore, it is believed that the condition of subsidence brought about in the "bump" area of old No. 2 mine is directly responsible for the "bumps" affecting the new No. 1 mine. In other words, had the No. 2 bed been unworked, the "bumps" would not have occurred from the method of mining carried on in No. 1 mine. There did not seem to be any evidence of subsidence in driving the No. 1 entries and rooms. Moreover, in going into undisturbed ground beyond the No. 2 mine subsided area, the danger of further "bumps" would be reduced to a minimum, provided from 75 to 80 per cent. of coal be left intact and the pillars be left undisturbed until the mine is retreating.

After conditions in the Crowsnest coal field had been thoroughly investigated, a conference of local and district mining officials developed a future remedy for "bumps" as shown by the dotted lines in the plan of the mine workings, Fig. 2. Under this system less than 15 per cent. of the coal will be taken out on the advance. For the protection of the employees in No. 1 mine, the rash and roof coal is to be taken down to a point as near the face as practicable; by taking this precaution, it is not probable that should a "bump" occur any one would be injured. The method of mining out the roof coal in advance of the main seam and the necessary timber required is shown in Fig. 5. In this sketch is shown a plan which is recommended for trial; the numbered blocks (dotted) of coal and rash are indicated in the order of their extraction. In this plan an attempt is made to avoid mixing the coal and the rash, as the addition of the latter impurity to the coal would seriously damage the coke.

A problem of great importance in working the coal beds in the Crowsnest field is that of adequately taking care of the large quantities of gas met with; this applies especially to the future developments under deeper cover and at greater distances from the outcrop. Very wisely the mines are not allowed to equip with elec-

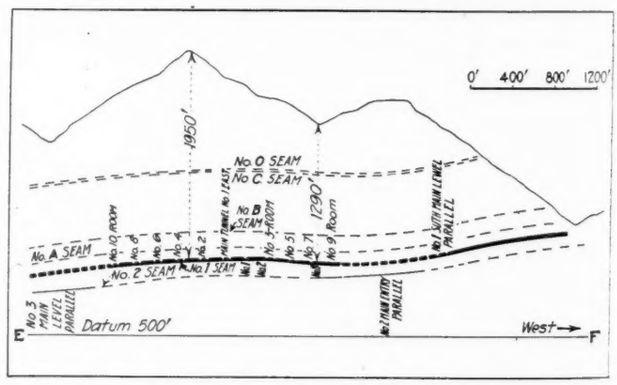


FIG. 4. GEOLOGICAL SECTION AT COAL CREEK COLLIERY ON LINE E-F (FIG. 2)

tricity for haulage or lighting, as the danger is too great.

The following important facts developed during the investigation of these mines: The flow of gas as measured by the analysis of the air in the returns and the outbursts of gas which occurred at the Morrissey collieries show that the Crowsnest Pass coal field mines are among the most gaseous in the world. Gas in these mines is derived from two sources—that stored in the crevices and joint planes of rock and coal; and that occluded or the gas held in the pores or cells of the coal. An unusual condition has been found in testing the amount and kind of gas given off by the broken coal, which shows that an unusual quantity of hydrocarbon gas is given off by the coal on grinding fine

in vacuo, and that three times as much ethane and other hydrocarbons are given off as methane under these conditions.

The following recommendations are made regarding gas flows: Since the gas pressures rapidly lessen from about 18 lb. at a distance of 21 ft. from the face to nothing at the face of the coal, it is indicative of the importance of draining the coal measures by advance headings. Drill holes should be kept in advance of the main heading and in faulty ground, and such entries

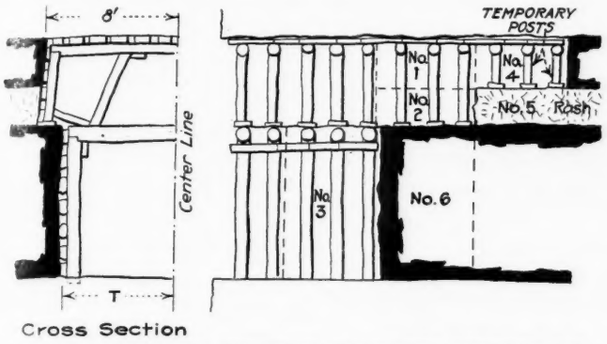


FIG. 5. SECTIONS SHOWING PROPOSED METHOD OF MINING AT COAL CREEK COLLIERY

should be advanced at only a moderate rate in order to permit the slow draining of the gas. In those portions of the field which permit of mining by the longwall advancing system, this method should be used from the outcrop. Longwall would probably drain off the gas more slowly and safely than pillar-and-stall work. This system could probably be applied to the mining of the No. 2 bed.

It was found in this investigation that there are obscure matters which can only be cleared up by further investigation. The recommendations for such investigation by a commission are as follows: (1) The carrying on of experimental methods of mining the coal, especially in No. 1 bed, so as to lessen the danger in the case of "bumps" and to look into the best method of timbering. (2) To determine the amount of occluded gas in the different coal beds, how it is held—if there is any chemical instability which might be connected with any shrinkage of the coal in pillars. In this connection plugs or monuments in the roof, ribs and floor might be established at various points in the mine to determine whether movement or shrinkage is going on. (3) In the matter of protection from firedamp, to continue the gathering of samples of mine air and to obtain data on the drainage of gases from the coal beds both when the mine is working and when it is idle. (4) To drill a number of long boreholes in advance of the working faces to determine the amount of gas given off and to record the gas pressure at regular intervals from the inner end of the hole to its mouth. This information should determine the rate at which the entries should be allowed to advance. (5) The greatest function of this commission would be to determine how the mines in this field should be laid out so that all the coal may ultimately be obtained. It seems to be impracticable to sink shafts in the larger part of the field, and if the coal has to be attacked from the outcrop, then it will take entries six, eight or even ten miles in length to mine the interior of the field. (6) It is recommended that an advisory commission be created to confer with the officials of the province and that it be made up of men of authority on scientific and technical matters, including a geologist, a mining engineer, a chemist and an experienced mine operator.

Minecdotes

A Dud?

One day while making an inspection of some of his working places, the inside foreman had a rather exciting though somewhat amusing experience. The place pitched about 70 deg., and after calling up to the men who were apparently at the face, and being assured that everything was all right, he proceeded to climb up the manway. He passed the first crosscut, and when about midway between that and the next one above, he was somewhat startled to look up and see the stolid face of the miner peering down at him saying, "Better watchen, Mr. Boss, one hole he no go off yet."

Some Man

An old man who had picked on the breaker platform for a great number of years at a mine where the coal was all hand loaded, had the surprise of his life when some stripping coal, loaded by a steam shovel, was dumped on the table.

A new stripping had been started, and without his knowledge the shovel loaded its first trip this day. The big lumps of coal passed down the table, each time accompanied by a bulging of eyes and a shaking of his head on the picker's part.

Finally the platform boss could contain himself no longer over Steve's strange actions, so he asked him what was the matter.

"Oh," said Steve with a deep sigh and a great shrug of his shoulders, "I work this place long time, I never see big ones like come today. By gee, must be strong man some place."

A Fast Day for the Driver

At a certain mine there is a traveling way for both men and mules. At one place in it the top is about 6 ft. high. Very often the drivers would ride up on one of their mules and when coming to this low spot lean forward along the mule's neck and pass under without a mishap. But this day the unexpected happened, the driver and the mule became wedged fast.

It was of course a rather ticklish although ludicrous predicament. Just how to get them free without physical injury to either was the question. The driver's yells and squirmings only increased the mule's restlessness. The beast was not of the circus variety, so would not lie down when asked; and, with the small amount of space in which to work, it was quite a problem.

Along comes John Hunk. He blankly took in the situation, sort of sniffed at the men being at a loss as to what to do, and said, "I fixen." He strode away to come back shortly with an ax. He walked up to the mule and was just restrained in time from cutting off the mule's legs.

* * *

It might be added that the man was safely rescued by using a lever across the mule's back.

British Columbia International Mining Convention

By Robert Dunn
Mines Department, Victoria, B. C.

HOW can present coal-mining operations in the Pacific Northwest be so improved as to obtain better commercial results in disposing of the product? Generally speaking, this was the question most to the fore in discussion affecting the coal-mining industry at the International Mining Convention held at Vancouver, B. C., from Mar. 17 to 19. The speakers were G. W. Evans, coal mining engineer, U. S. Bureau of Mines, Seattle, and Francis W. Glover, manager of the Princeton Coal and Land Co., Princeton, B. C.

Mr. Evans' paper contained valuable information to operators and was much appreciated. Emphasizing the constantly growing necessity of placing the smaller sizes of coal on the market in such shape that they will satisfy the trade because less of the lump coal is being mined and because present conditions in this respect are bound to become accentuated, he referred to the problem of the utilization of much that heretofore has been considered waste in the form of powdered fuel. Dealing with the latter development, he told of plants installed in various parts of the northwest, and particularly in the City of Seattle, which were equipped for the use of this fuel for heating purposes and were obtaining satisfaction therefrom.

In this connection the coal-mining delegates were afterward given ocular proof of what can be accomplished in this direction by witnessing the powdered fuel plant recently set up at the factory of the British Columbia Sugar Refining Co., Vancouver, B. C., in operation. The new furnace, which supersedes one designed for oil consumption, had been in operation for just two days prior to the demonstration. The interested visitors were informed that up to the present the installation has given entire satisfaction. The fuel in use was being obtained from a Vancouver Island colliery. It was waste coal which had been submerged for seven or eight years and, until very recently, never considered as an asset owing to its high ash content, running between 26 and 30 per cent. in ash. After being pulverized, however, no difficulty was experienced in respect of combustion in the furnaces with which the sugar refinery is provided. The expectation was that it would prove just as satisfactory as the oil and more economical.

Mr. Glover's address was more local in its application. He advised Government supervision of coal-mining operations to the end that wasteful methods in extraction of coal might be prevented. The practice of speculators acquiring coal lands and holding them for high prices was deplored. There should be more of the spirit of coöperation between employer and employee, the former making it his business to see that working conditions, both as to safety and convenience, were of the best, and the latter undertaking to see that all miners gave the best that was in them while at work.

Complimenting the collieries of the Province on their good work during the four years of the war, Hon. William Sloan, Minister of Mines, in opening the convention said: "I wish further to congratulate the collieries on the splendid effort they made during the war to meet the urgent need which we, and the empire as a whole, has for their product. Both the operators and the miners are to be felicitated on the plucky manner in which they stuck to their guns. They have the satisfaction of knowing that they did their bit and I would have them understand that their work is appreciated." He pointed to the production of 1918, the outputs of both coal and coke exceeding 1917 figures; the increased production of coal being some 142,093 tons, while that of coke was 30,751 tons. As the value of coal had advanced substantially, the product of the coal mines during 1918 represented about $12,794,932, an increase over 1917 of $4,310,599.

Addresses were given by the different Government mining engineers, W. M. Brewer referring to the coal-mining development of Vancouver Island; R. W. Thomson touching on operations in the Nicola District; P. B. Freeland dealing with the promising bituminous fields of the Princeton section; while J. D. Galloway briefly described coal-mining operations in the Twelkwa section on the line of the Grand Trunk Pacific Ry., and predicted the opening up of more good mines when this country is further prospected.

A digest of the address made by G W. Evans, of the United States Bureau of Mines, which was referred to in the opening paragraphs of this account, is given in the following:

Better Preparation and Utilization of Coal

G. W. EVANS, coal mining engineer, Northwest Experiment Station, U. S. Bureau of Mines, Seattle, stated at the outset that his remarks would not be specifically with regard to the bituminous coal of British Columbia. As, however, the coal of this character in the State of Washington was similar to that of this Province, the problems confronting the people of the two countries in this respect also were similar. His plea was for the greater use of the smaller sizes of coal, largely disregarded by both producer and consumer. Coal operators in both British Columbia and Washington knew that the percentage of large sizes was decreasing and the quantity of small coal was increasing. This change, he said, had been brought about partly by the inferior class of coal miners of now compared with former years.

Today some of the coal miners, particularly in the State of Washington, knew only how to drill a hole and fire a shot; some did not know even how much powder should be used. The result was that the coal is shot into small pieces, and in steeply pitching coal beds the coal is further broken up by falling down the chutes. It was therefore necessary to face the inevitable fact that the percentage of lump coal will decrease and the small sizes are going to increase as time goes on unless new coal fields are discovered. It behooved us, for these reasons, to make preparations to save more of these smaller sizes and offer them to the public in the cleanest possible condition. To separate impurities

from the coal in the smaller sizes was a more difficult matter than to clean the coal of larger size. In the anthracite coal fields of Pennsylvania dry cleaners were used for the smaller sizes and, at one bituminous mine in the State of Washington, a spiral separator was tried with only partial success.

It has been found, the speaker asserted, after years of experimenting that treating the coal in a liquid, thus taking advantage of the difference in specific gravities between the coal and its associated impurities, is the only practical way of making a proper separation. Experience, he said, has taught that, in order to get the best results in the washing of coal, the washer should be of proper design, properly adjusted and operated. He had seen plants where tubs appeared to do pretty good work, but for a new plant would not recommend the tub except in an emergency.

Mr. Evans proceeded then to describe some of the coal-washing plants that are now being built, and after describing the various methods of their operation declared that to get the best results a thorough study should be made of the coal to be washed and the type of jig installed that would best suit the purpose. Such studies and designs should be by someone competent to make such investigations. He did not advise ordering from a catalog, suggesting that the operator should take his coal-washing problem to a specialist and ask for a guarantee so that the resultant product would measure up to certain specifications. In this connection he said, "Our coal-washing plants are being built with more refinements each year, in order to successfully meet the requirements exacted by more complex coal and an effort to practice true conservation."

Jigs Require Careful Attention

Mr. Evans recommended that operators should pay more attention to the efficient operation of their jigs. Very few could tell what results they were getting, and little did many of them realize that the amount of good coal going to waste or the percentage of absolute waste in the wash product can be determined by a proper study with a "float-and-sink" machine, and the necessary corrections made in the jig.

Briefly outlining the manner in which this work is done, he said: "Samples are taken every 30 minutes for a period of eight hours at different parts of the plant. Careful head samples are taken of the material going into the washery; also samples are taken at each of the refuse discharge gates of the machine, and as the washed product passes over the conveyor from the jig it too is carefully sampled. Next day each of these samples should be treated about as follows: The original samples should be coned and quartered—care being taken not to break the particles in the sample—until a representative sample of about 40 or 50 lb. is obtained. This smaller sample is further quartered until the required size sample is secured, which is to be used in the 'float-and-sink' machine. The machine is then filled to the required height with a solution of zinc chloride of the proper density.

"This particular density is called the 'permissible bath' for the coal under consideration, and might range from 1.35 to 1.65 specific gravity, depending on the amount of adherent ash in the coal and the amount of ash the coal market will assimilate. The head sample is then run through the machine. The marketable product will float and the refuse will sink. Each part is weighed and in this manner the percentages of each are determined. The results obtained on the head sample indicate what the washers should produce if they are working at an efficiency of 100 per cent.

Percentage of Coal Wasted

"The 'float-and-sink' machine, by the way, is assumed to be a 100 per cent. efficient separating machine. The refuse is treated in the same bath, and if the washer is doing perfect work, there will be no float; and in treating the product there should be no sink. This seldom happens. The percentage of float in the refuse and the percentage of sink in the product are used as factors in determining the efficiency of the coal washer. By making these determinations adjustments of the length of stroke of the jigs and experiments with the sizes to be treated to get the desired results can be made. The man who operates the jigs will more clearly understand what is required of him and the machine he is paid to operate."

Quoting from a bulletin published by the Commission of Conservation of Canada on the conservation of coal in 1914, Mr. Evans enumerated the equipment of which the principal collieries of British Columbia were provided in respective washers at that time. He pointed out that the same authority estimated that the cleaning losses are as follows: Hosmer mine, no loss because small size is coked; Nicola Valley Coal and Coke Co., no estimate; at the Western Fuel Co.'s mine the sludge and other unmarketable coal is used under the company's boilers, and in the Northfield mine of the same company it is estimated that the sludge loss is 2 per cent.; at the Vancouver Nanaimo Co.'s plant the coal less than ¾ in. was wasted; no estimate was made as to the amount. There is 15 per cent. of the output of the Fiddick mine of the Pacific Coal Mines, Ltd., that is wasted; at the Extension colliery of the Canadian Colliery Co. it is estimated that about 34 per cent. is wasted in bone and slack, and at the Union washery of the same company there is a waste of 24 per cent.

"Of course, these percentages," Mr. Evans said, "do not all represent clean coal; but it is safe to assume that between 5 and 10 per cent. greater recovery could be made in treating the Nicola Valley and Vancouver Island coal if crushers were used on the larger impurities, such as bone and coal and coal and shale from the picking tables and the middlings from the jigs, and the crushed material either treated on tables or in jigs; and if the bird's-eye or sludge now being wasted were treated on properly designed tables. These are features well worth considering carefully. A 7 per cent. saving on the coals for these two fields would probably equal 140,000 tons, which in itself is worthy of an effort."

At one plant in the State of Washington using a well known jig, Mr. Evans stated he personally saw 80 lb. of white rock picked from seven tons of coal that was supposed to have been cleaned by that jig, yet the company, which was paying a man good wages to attend to the jig, wondered why the people of Seattle complain at the amount of impurities in the coal. Let us have more study and education along this line, he said.

Until recently we were satisfied to let the refuse from the jigs go to the waste dump without further thought, he continued; today many of the progressive companies are crushing some of the refuse and all the middlings, and treating them either in another jig or on properly designed tables.

Also until within the past few years little thought was given to the waste water and smaller sizes, usually called bird's-eye or sludge, but at present in some plants the waste water along with its load of small coal and associated impurities is conveyed to a settling tank and from the settling tank is fed to properly designed concentrating tables. The tables generally used are what might be called nephews of the old Wilfley table, familiar to ore-dressing engineers. As a rule the riffles used are higher and the surface of the table is differently arranged.

Efficient Plant Wastes Nothing

A coal-cleaning plant operating along most modern lines does not waste very much except the color in the water. Probably some enterprising engineer will attempt to recover the color by means of an Oliver filter.

Mr. Evans stated that coal operators might ask what was the use of all this refinement in coal preparation and saving of small sizes when they were unable to dispose of one-half the small coal on hand. This led him to the second part of his paper under the heading, "The Better Utilization of the Small Products from the Washers." He said that the product of such a field as that of the Crow's Nest gave rise to no problem because the smaller sizes can readily be used in making coke. It was different, however, with noncoking, bituminous and sub-bituminous coals.

Continuing, he said, "In many of the large steam plants mechanical stokers of some form are in successful operation. They burn the small sizes efficiently with little or no smoke given off. The ash formed is disposed of mechanically. In fact everything goes along pretty well in a large plant, but only the larger plants can afford to install mechanical stokers. In the smaller

plants where the installation of large stokers is not justified because of the expense, the boilers usually are fired by hand. In plants where the expense of installing large mechanical stokers is not justified or even where justified in some instances, powdered coal equipment is now being installed. Today we find that pulverized coal is being used in many steam and heating plants of some cities. Several large buildings in Seattle have recently replaced California fuel oil with powdered coal and, according to the statements of the engineers in charge of those plants, they like the powdered coal best."

The speaker proceeded to enumerate some of the powdered-coal installations in the State of Washington, mentioning the Western Avenue plant of Seattle, the Puget Sound Traction Light and Power Co., and describing equipment. The coal was ground so that 95 per cent. of it will pass a 100 mesh screen. Renton buckwheat and bird's-eye or sludge is used. "In this connection," Mr. Evans stated, "it might be well to mention the fact that at the Renton coal mine the company years ago was forced to dike the bird's-eye and not allow it to go into the streams with the waste water because of protest from the neighboring farmers. Today they are loading coal from the pile of 160,000 tons saved by means of a drag scraper and utilizing it in their Seattle powdered coal plant. This is a plan that others might follow to their advantage."

Other installations mentioned were the Superior Portland Cement Co.'s plant at Concrete, Wash.; that at Briquettville, Wash., where the powdered coal used in some of Seattle's largest buildings is pulverized; that of the Pacific Coal Co. at the Black Diamond coal mine. At Black Diamond, he said, the smallest sizes of the Black Diamond coal is used which is non-coking bituminous; at the Coal Creek plant of the same firm they were using the smallest sizes of the sub-bituminous coal of the Coal Creek mine; at Briquettville they were using a mixture of Black Diamond-Coal Creek and the coking bituminous coal of the Burnett mine.

The following well-known buildings of Seattle, it was stated, are using powdered coal: The Seattle Natatorium, or Crystal Pool; New Richmond Hotel; Broadway High School and the 42-story L. C. Smith building. The air pressures used at these plants ranged from 2 to 3 lb., and the pulverized coal was hauled to Seattle in five-ton air-tight tanks from Briquettville, a distance of 12 miles.

Mr. Evans followed with some notes taken from a detailed report of a 24-hour test made during February, 1919, on a Babcock & Wilcox boiler of 600 hp., which during the test had a rating of 125 per cent. Without going into details he quoted a few of the economic and efficiency results obtained:

Water fed per pound of coal fired	8.50 lb.
Water evaporated per pound of dry coal	8.35
Equivalent evaporation from and at 212 deg. F. per pound of combustible	11.30
Calorific value of one pound of dry coal	11,660 B.t.u.
Calorific value of one pound of combustible coal	13,700 B.t.u.
Efficiency based on coal fired	78.95 per cent.
Efficiency based on combustible	60.05 per cent.

Continuing, Mr. Evans said that there was quite an accumulation of slag on the sloping sides of the furnace which is removed at intervals of one to two months when it has accumulated to a thickness of 6 to 12 in. The ash accumulated in the boiler tube was removed by the aid of a soot blower. The condition of smoke was light; there was no backlash; the effect on the brickwork was not noticeable; there was no pulsation and it was the opinion of the engineer who made the test that the results were satisfactory. The coal used was screenings from the Issaquah mine of the Pacific Coast Coal Co., which is sub-bituminous.

Dealing with comparative costs of fuel oil operation versus powdered coal, Mr. Evans quoted some observations by C. F. Harrington, mechanical engineer, on the use of powdered coal. After giving statistics the speaker pointed out that the conclusion was that, with fuel oil at $2 per barrel and washed bird's-eye coal at $2.50 per ton, there is a marked saving in favor of powdered coal.

Comparing powdered coal with fuel oil Mr. Evans pointed to the analyses of some Western coals. These show that they average 10,000 B.t.u. per pound—that is, figuring conservatively, 20,000,000 B.t.u. per ton. If California fuel oil averages 18,500 B.t.u. per pound and 7.8 lb. to the gallon, 42 gal. to the barrel, we would have 6,000,000 and 60,600 B.t.u. to the barrel. It takes therefore approximately 3¼ barrels of oil to the ton of coal. The oil would have to be sold at 80c. per barrel to be on a parity with coal at $3 per ton. With fuel oil at $2 per barrel, one could afford to pay $6.66 per ton for the coal except the cost of handling the ash, which is not great. There is no smoke given out by the stacks of these smokers when they are operated properly.

Concluding, the speaker said: "By definite teamwork on the part of the coal producers, the coal salesmen, the fuel engineers and the public a large percentage of the small coal now being wasted can be saved to the coal companies and the state or province. Such teamwork will be a factor in successfully overcoming the inroads made into fuel markets of the northwest by California fuel oil and cause this same oil to be utilized along lines where it will do the greatest amount of good. The oil supply of the world is limited and should be conserved. The supply of coal in the Province of British Columbia and the State of Washington, not to consider the coals of Oregon and California, are sufficient to last the needs of the Pacific Coast states for hundreds of years, and why not utilize these coals to the best advantage? By practicing true conservation we will make the supply last longer, and the consumer will be able to buy a better grade of coal at a cheaper price.

Francis Glover, of the Princeton Coal and Land Co., Princeton, B. C., in dealing with the better utilization of British Columbia coal suggested that the Government should introduce legislation preventing the coal lands falling into the hands of speculators whose one idea was to hold them in order to sell at a profit. Engineers, he said, should be appointed by the Government to see that coal was not extracted by wasteful methods. As to operators, he declared that they should realize that all conditions relative to the human element should be of the best. By this he meant safety conditions, living conditions and working conditions. They ought to have the most up-to-date machinery and tackle, and should be ready at all times to work in harmony with labor, referring disputes to the Government Board of Control and abiding by the decisions. On their part the laborer should realize that production is imperative to the success of the coal industry.

He spoke of the necessity of the railways providing the best transportation facilities possible, and expressed the opinion that in the past one of the great drawbacks to the profitable mining of coal in British Columbia has been the intermittent tonnage. By this he meant periods of slackness and periods of great activity. This led, during the slack period, to the deterioration of workings and roadways, and had the effect also during the periods of great activity of tempting operators to attain a fictitiously high output by following the line of least resistance and neglecting development work.

In speaking of the present methods of burning coal, Mr. Glover termed them a disgrace and thought that there should be some effort at an educational campaign that would result in the practice of economy by the general public. He also dealt in a general way with the problem of utilization of the many valuable by-products of coal.

Of the 500 odd delegates, between 25 and 30 were representatives of the coal industry. Some of the latter were Mr. Evans, already referred to; D. C. Botting, Commissioner of Washington State Coal Operators Association; Professor Landis and Dean Roberts, of the University of Washington; George Wilkinson, Chief Inspector of Mines for British Columbia; Ralph Smith, vice-president of the Pacific Coast Coal Company;

S. H. Greene, superintendent of the same company; John Ryczeh, sales manager of the Roslyn Cascade Coal Co., Roslyn, Wash.; G. E. Rockefeller, mining engineer, United States Government; Percy E. Wright; Mr. Rouse; Mr. Bogardus; H. H. Sanderson; G. E. Collins; Mr. Dalby; Mr. Seagraves; F. W. Glover; Donald MacLean, manager of the Coalmont collieries; R. Stirling, Thomas Price and William Walls, engineer, master mechanic and superintendent of diamond drilling respectively for the Canadian Western Fuel Co.; Joseph Daniels, coal geologist, and Dudley Michel, superintendent of first-aid work for the British Columbia Department of Mines; Frank Good, superintendent Carbondale Coal Co.; D. S. Hanley, president Carbon Coal and Clay Co.; Mr. Pearce, general sales manager Carbon Hill Coal Co., and Irving Gard, engineer for Frank Waterhouse Co.

Coal Near Mesa Verde National Park

Fuel is scarce in southwestern Colorado, so the coal found in the vicinity of Mesa Verde National Park is of considerable interest. The coal beds in the park are not at present minable, but those that lie northeast of the park, near Mancos, Colo., could supply a large part of the region west of the San Juan Mountains, which must obtain its coal either from this field or from others farther north. The coal near Mancos is found near the tops of rugged mountains that are cut off from the Mesa by deep canyons and must be lowered down the mountain sides on inclined tramways for shipment. A mine operated in this way on Menefee Mountain, at an altitude of 1100 ft. above Mancos, may be seen from the Rio Grande R.R. at that town.

The Mancos field is on the northern edge of a great expanse of land containing coal that ranges from a bituminous coking coal, mined at Durango, Colo., to a high grade sub-bituminous coal mined near Gallup, N. Mex. The coal near Mancos has nearly as great heating value as the coal near Durango and is of nearly the same quality as the coals of southeastern Illinois, western Kentucky, Ohio and southeastern Kansas.

Geologists describe the rocks of these mountains as the Mesa Verde group, which consists of the Point Lookout sandstone at the base, about 300 ft. thick, the Menefee coal-bearing formation in the middle, about 400 ft. thick, and the Cliff House sandstone at the top, about 400 ft. thick. The Point Lookout sandstone was named from Point Lookout, the northernmost point of the Mesa Verde National Park, about 7 miles southwest of Mancos, and the Cliff House sandstone was named from the prehistoric ruins in the park called cliff houses, near which it is most strikingly exposed.

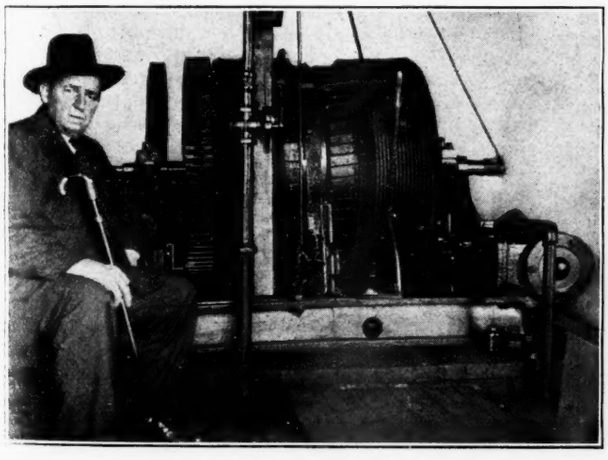
The coal beds are confined to the summits of the mountains and were recently examined at many places by a geologist of the United States Geological Survey. They are very irregular, but at almost every place where the whole section of the coal-bearing formation is exposed, from one to four coal beds, each thick enough to mine, have been found.

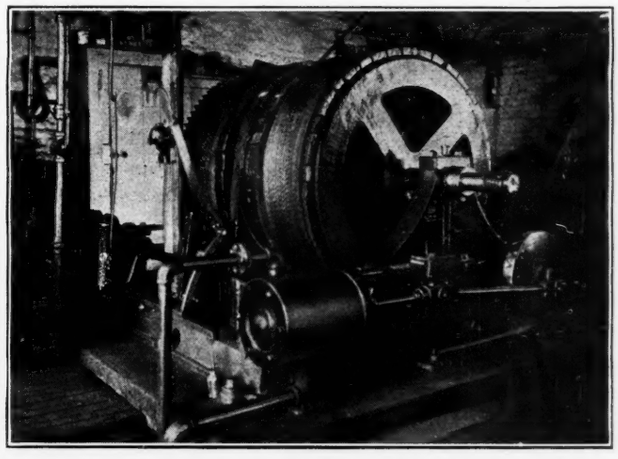
A report entitled "Coal South of Mancos, Montezuma County, Colorado," by A. J. Collier, describing the rocks and coal resources of this region, has recently been published by the United States Geological Survey, Department of the Interior, as Bulletin 691-K, and may be had an application to the Director of the Survey.

Handling 2¼ Million Tons in 37 Years

Thirty-seven years of continuous operation is not a bad record for any machine. Such, however, is the record of the mine hoist of the Centerville Block Coal Co., at Centerville, Iowa. This machine is shown in the accompanying illustrations.

The hoist, a single-drum, back-geared Lidgerwood, was purchased and put to work in the early eighties and has been kept in practically continuous daily operation ever since. Alex. Dargavill, superintendent of the mine (shown at the left in one of the photographs), says concerning this machine: "Our company bought this engine in 1882. It has been in continuous operation ever since, hoisting out of a shaft 170 ft. deep at a present rate of 350 tons per day. The unbalanced load at each trip amounts normally to 3000 lb. A careful estimate of the acreage mined out shows that 1¾ million tons of coal has been produced. The dirt and slate removed in driving entries and turning rooms is estimated at another half million tons."





MINE HOIST WHICH HAS SEEN 37 YEARS OF CONTINUOUS SERVICE AT ONE OPERATION

These tonnage figures tell their own story. They show chiefly two things: (a) The engine must have been built and installed right in the first place, and (b) that it has been handled and cared for properly. Engines do not last for any such long term of years unless both of these conditions are fulfilled.

More Light on the Railroad Fuel Situation

Unless the President takes mandatory action, which it is not expected he will do, the efforts at peace-time price-fixing have come to naught. It is generally recognized that it was the coal operators who forced the issue and established conclusively that the Railroad Administration would not be a party to the effort of the Secretary of Commerce to promote business activity by stabilizing prices until the end of the year.

The Industrial Board of the Department of Commerce, which has the matter under its supervision, was not taken seriously at first. Much prestige came to it, however, as the result of the success in obtaining a 10 to 14 per cent. reduction in steel prices. The steel men, apparently, took it for granted that the Government would hold up the hands of its own board, and learned through the coal men that the Railroad Administration would not buy rails at the price agreed upon.

The coal men, having clearly in mind the repudiation of the Peabody committee, called upon the Industrial Board for assurances that the Railroad Administration, the War Department, the Navy Department and the Interior Department would buy coal at the prices agreed upon. Much to the surprise of Chairman Peek, the Railroad Administration insisted upon continuing the purchase of coal in its own way.

The disclosures confirmed the suppositions of the National Coal Association that the railroads are making use of every means in their power to beat down the price of their coal. Tart exchanges took place between Director General Hines and J. D. A. Morrow, general secretary of the National Coal Association. Mr. Morrow declared that the Railroad Administration had returned to "unfair practices which would drive the price of railroad fuel below the cost of production." Mr. Hines retorted by characterizing Mr. Morrow's statement as "interesting fiction," but leaving the inference that the coal operators are conspiring to boost the price to the Government and to the public. This led Mr. Morrow to go into detail as to the practices being resorted to by the Railroad Administration in the purchase of coal. A portion of his statement in this connection follows:

The United States Railroad Administration claims that its present arrangements in obtaining railroad fuel coal will adequately safeguard the public interest involved. For example, to avoid unduly depressing the prices of coal, the Director General has prohibited the purchasing agents of the various roads from naming prices which the operators must meet to obtain a share of the business, but he permits coal speculators to bid on the railroad business without naming the mines from which the coal is to come, and without having their commitments covered in advance, whereupon these speculators adopt precisely the tactics which he has forbidden his own agents to use.

It is stated that the tonnage will be distributed fairly through permitting the purchasing agent of each railroad to buy his own coal. So far as is known, however, there is no practical provision to prevent the purchasing agents of different railroads from bunching their orders in the same district or in the same mines. Since it is the policy of the Railroad Administration to buy cheaply, it is the inevitable tendency to bunch orders in the low-cost districts and in the low-cost mines. As an illustration, when the Pennsylvania Lines West closed their Pittsburgh district fuel business for the month of April, within the present week, a half dozen operators were given the entire business at low bids, some of which were below the cost of production and were so specified when the bids were sent in. Other operators who have normally shared in this business were deprived of their orders.

In the Hocking Valley district of southern Ohio, railroad fuel orders have been placed with a number of smaller operators producing inferior grades of coal at reduced prices, while the mines which have in previous years regularly supplied this road have been denied participation in the business. In this case the coal now being taken was rejected by the Railroad Administration when tendered to it for locomotive purposes within the past year.

When the Missouri Pacific Ry. arranged for its coal supply recently, the determining factor was the bid submitted by the Western Coal and Mining Co., a subsidiary of the Missouri Pacific Ry. Other operators were given an opportunity to share in the business at the price named by the Western Coal and Mining Co. Even if the price named was above the cost of production, we consider the method employed in this case, and which can be employed in other cases, to be manifestly unfair. It is an old-time method of purchase which resulted in grave abuse.

As evidence of good faith and of fairness to all parties concerned, the coal operators asked that all bids on railroad coal be made public, as is done by every other Government department. This request has been refused, and only information made public as to the price at which the business is finally placed. Despite the Director General's public statement of Feb. 19 that this information would be available to any interested party, it has been refused coal operators and their accredited representatives as late as Mar. 28, on the ground that local representatives of the Railroad Administration have no instructions to give out such information.

In short, the bituminous coal operators have endeavored to obtain the coöperation of the United States Railroad Administration in an effective manner, to deal with a question which they consider of vital interest to the general public. The Industrial Board appears to them to afford a medium by which a practical solution of the difficulties could be obtained with all the rights and interests of the general consumers of coal entirely safeguarded. They are still ready to coöperate with this board and the Director General of Railroads in what seems to them an eminently broad and sensible program to meet an extraordinary condition.

Government Will Record Fluctuations in the Price of Coal

A permanent record of price fluctuations in coal, prior to the war, during the war, and after the signing of the armistice, is to be made by the Government. The work is under the direction of C. E. Lesher, the geologist in charge of coal for the Geological Survey. Commenting on the Peabody prices, Mr. Lesher says:

Whether the reduction in prices effected by the voluntary action of the producers would have satisfied the public and met the needs of the situation never will be known, for no sooner were the results announced than the Secretary of War publicly repudiated the action of the Committee on Coal Production, stating that the prices agreed upon were unwarrantably high.

It is not necessary to pass judgment on the reasonableness of the Peabody prices. That they were higher than necessary to return the cost of production and a moderately fair profit to the producer has been shown clearly by the subsequent investigation of the committee of engineers of the Fuel Administration. The important point is that the Peabody prices were substantially below those prevailing at the time. They were, from their inception, understood to be a temporary stop gap, pending a determination of more exact and proper prices. They were the first and practically only prices representing a reduction, established by an industry as a whole for the benefit of the entire public.

The Peabody prices did not apply to coal sold for export and, as a result, Canadian consumers were able to outbid those in the United States. New England and Canada depend upon the fields in central Pennsylvania for their supply by railroad routes. Under these circumstances, New England consumers were unable to obtain satisfactory deliveries of bituminous coal and induce operators in central Pennsylvania to break away from the Peabody price. Although the Peabody prices were claimed to be exorbitant, the only important divergence from the price resulted from the action of consumers, and was an increase.

The flurry in prices for Clearfield, Somerset and Cambria County coals in the winter of 1915-16 was the first evidence of the impending shortage that became such a feature from October, 1916, to the end of the war. The orders of the Allies for war materials first were placed largely in New England, and the speeding up of industries in that section made the demands for coal from the tributary all-rail fields of eastern Pennsylvania so insistent that spot prices soared to more than double those obtaining a few months previously. Beginning in July in many districts, and by August in all districts, prices started upward in response to a demand the insistence of which was not appreciated at the time. With a suddenness and to an extent unequaled in the history of the bituminous-coal industry, spot prices rose nearly 300 per cent. in six months. In Ohio and Pennsylvania the increase was greater. The highest spot price recorded was more than 400 per cent. above the pre-war level.

Public discontent with the continued high prices was manifested strongly. Notwithstanding that it was the bidding of consumers, one against the other, that was responsible for the high prices to an extent equal to if not greater than the setting of the price by the producer, the producer was held responsible for the condition.

Effective Mar. 15, 1919, embargoes which were in effect since December, 1915, and January, 1916, against coal to Hudson River gateways for reconsignment, have been cancelled, according to a recent announcement issued by G. N. Snider, coal traffic manager of the New York Central R.R. The combination of rates to and beyond these gateways, however, exceed the joint rates from the mines, so if benefit of the joint rate is desired, reconsignment requests must be made to the New York Central R.R. direct, in accordance with Reconsignment Circular C. T. D. 237.

Coal Operators May Recover Part of 1917 Income Tax

Coal producers may be able to recover some of the money they paid to the Government in income taxes in 1917 if they will file with Commissioner Roper of the Internal Revenue Division of the Treasury Department the necessary data to enable the Commissioner to fix the proper basis for the different classification of those engaged in the coal industry, with a view to applying the law in a uniform manner.

The foregoing is the substance of a conference had by W. A. Marshall and Charles S. Allen, president and secretary respectively of the Wholesale Coal Trade Association of New York, with Commissioner Roper in Washington recently, when the subject of unequal assessment of income and excess profits taxes on those in the coal industry was discussed. In substance Mr. Roper said to Mr. Marshall and Mr. Allen:

"I know there are inequalities; I am anxious they should be eliminated and that the tax should be applied uniformly. The facts concerning those inequalities are so diversified that it is impossible for my department to determine them. Therefore I must depend upon your industry to gather the necessary data and submit them to me. When that is done for a substantial part of the industry, I will then fix proper bases for the different classes of those engaged in the industry, with a view to applying the law in a uniform manner."

Investigation shows that there were large sums paid in taxes for 1917 which should and will be refunded when the facts are placed before Mr. Roper, says Mr. Marshall in a Bulletin issued by the Association of which he is president. When these data are placed before the Commissioner the 1918 taxes will then be fixed upon a proper basis.

Mr. Marshall and Mr. Allen have arranged with Gibbs L. Baker, who has looked after the interests of many coal men in Washington during the past year, and with James T. Lloyd, a former Congressman, to take care of the interests of the coal men who are members of the New York Association.

Mr. Baker has discussed the entire matter with Commissioner Roper and says the Commissioner agrees that the present classification of the coal industry is entirely unscientific and unjust, and is anxious to have the coöperation of the industry in trying to reach a satisfactory classification.

As tentative returns for the 1918 tax have been made and an extension of 45 days has been granted to file permanent returns, Mr. Baker says it is absolutely necessary that coal men give the matter immediate attention. Mr. Baker is of the opinion that all the wholesalers should be classified as personal service concerns, not only for 1918, but also for 1917, where no actual investment of capital is involved. "And when I say 'actual invested capital,'" says Mr. Baker, "I mean invested capital as an income producing factor."

There may be wholesalers who have some investment in mines or stock of mining companies, and that will take a different classification under another section of the law. There is still another class of wholesalers who have a considerable investment, but disproportionate to their incomes. This class of cases is in the same position as the operating companies with a small capital and a comparatively large income, and will take a still different classification.

EDITORIALS

What Shall Be Done to Trouble-Makers?

AT EVERY period of the world's history society has tried to suppress its trouble-makers, for at all times it has been possible for a man diligent in promoting discord to set his neighbors by the ears. With false stories and innuendoes, with lavish promises and baseless visions of advantage, it is easy to separate fast friends and make coöperation between them impossible. Strange to say, the professional peace-makers are among the most prolific spreaders of doubt and suspicion.

Early in the history of common law, the crime of barratry was defined as an attempt to stir up trouble either in the courts or elsewhere. It was ultimately decided that three such meddlings in other people's business justified the courts in meting out punishment. Then came the period when the trouble-makers became so persistent and annoying that communities established and courts condoned such instruments of torture as the scold's bridle and the ducking stool.

Today we are face to face with somewhat different but more troublesome bodies of disturbers—the Bolsheviks or Industrial Workers of the World. The emissaries of this organization make all kinds of impossible claims for a new order they intend to establish. Sneaking around from camp to camp they leave their literature advocating, it is said, a working day of about two hours and all kinds of phenomenal pay, and claim that the other six hours and the difference between the pay they advocate and the pay now received represents capitalistic peculation.

With the outcome of the work of these disturbers we may soon have to cope. Without any militia and with no state police in many of our commonwealths it will be an impossible matter to keep order. It is a question whether freedom of speech and of the press requires us to give place to such disturbers in peace or in war. To all matters there is a limit.

The peddling of information is subject to the same laws as the peddling of medicine. No man may sell talcum powder as aspirin or water as antitoxin. To do so is a fraud. Similarly, a man is not allowed to advertise a company's stock in a fraudulent manner. Even particularly unscrupulous religious healers have been arrested and punished because they imposed on certain of the feeble-minded and credulous.

If we can interfere with such freedom—freedom of trade and of religion—we surely should have ample justification for suppressing at least the most dangerous forms of freedom of speech. Some attempt should be made to have all men tell the truth. If the jail is not to be used, at least the bridle and the ducking stool and the rail might serve to make such perversions of truth appear as ridiculous and odious as they really are; and make the dissemination of such untruths an employment not unaccompanied by discomfort. These men cannot be martyred, for they know their faith is vain and that their "facts" are made to suit the gullibility of their hearers.

Do Not Die Too Soon to Get Tuberculosis

SUBJECT to revision, the United States Bureau of Mines says that 3.39 persons were killed per 1000 employed in 1918. If, therefore, 1000 men, subject only to accidental death, went to work at 16 years of age, 295 years thereafter all of them would, at length, have succumbed to the dangers of the mine by the laws of probability. The last man to die would be 311 years old when he was gathered to his fathers.

The number of men dying of accident year by year, assuming that the risk of death is independent of age, would decrease in proportion to the time, because the number exposed to the risk would be reduced by death year by year. Thus the average age of death would be the age of entrance into the mine, sixteen, plus a half of 295 years, or about 163 years—nearly three generations.

No wonder the mine worker expects to entertain the grim reaper in the village rather than at the mine. Miss Alice Hamilton, of the Bureau of Labor, speaking recently before the Academy of Political Science, said confidently of the mine workers: "Of course, we know that a great many of them do not live long enough anyway to get consumption; they die of accident." This, of course, is unfair, for the accident rate is not so high as suggested; and hence the accident rate does not in any way explain the low tuberculosis rate. She added, however, most creditably, "But even those who survive do not seem to get consumption when one would expect them to."

Miss Hamilton suggests that the miner may be subject to pneumonia, and the probability is worth inquiry. Especially does it seem likely in view of the large number of mine workers who have recently succumbed to "influenza." The actual cause of death was doubtless influenza's twin sister, pneumonia.

The Department of Commerce says, "Buy even at a sacrifice, for such purchases are patriotic." The Railroad Administration is making no effort to buy coal and hence is surely to be numbered among the unpatriotic slackers.

Making a Mock of Thermo-Dynamics

WHAT is the efficiency of a miner? He consumes at least 3000 calories in food a day, which is the equivalent of 5400 British thermal units, or 4,201,200 foot-pounds of energy. In an eight-hour day, working steadily and at limit of capacity, he probably does 800,000 foot-pounds of work. He rarely does anything near as much as that, but when he does his best he is about 19 per cent. efficient. It is more than likely that his average efficiency does not rise above 10 per cent., and often it is far less. Shall we argue therefore that the farmer should work less hours for the miner, seeing that the mine worker's efficiency in making use of the food values supplied him is only about one-tenth and

never exceeds one-fifth of the ideal performance?

Yet that is just the line of argument adopted by Mr. Smillie, the miners' leader in Great Britain, when he addressed the Sankey Commission on the wage demands of the mine workers. He said that the public did not utilize from the coal mined more than 10 per cent. to 15 per cent. of its heat content, so why should the miner be sweated to supply coal to the public when it used his product with such real or apparent wastefulness? It is certain that it is impossible for the public to convert more than about 25 per cent. of the heat in coal into work. It should do more than it is doing to reach that figure; but the miner also, who can produce 19 per cent., should not be content with only ten.

It is extremely easy to say that we should work without waste, that there should be an exact balance between work performed and heat expended; but this is absolutely impossible. We all need to be more efficient, but it must be remembered that if we render an account for 25 per cent. of the heat units delivered, regardless of whether we are stationary engineers or manual laborers, we shall do most excellently. Waste and work are unfortunatetly twin brothers.

If, however, there is to be economic use of material, surely the profit of economy should go to those who institute it, or to the consumer, and not to the raw-material man. Economy is attained not without labor and expense; and if another party is to reap what the first party has sown, there will be no economy, for it will not be a profit but a loss to the man who puts the economy in operation.

Government ownership is coming like a steamroller, crushing down all opposition. We do not dare to deny it, but would delay it as long as possible. Where workmen are all combined, and perpetually striking for more pay, shorter hours and more privileges, government control must come. Then the industrial army will be formed and everyone will be conscripted and subject to court-martial. The striker will be a traitor liable to summary punishment. The men who will not work will languish in jail. There is no cure for this desperate outcome—other than sanity in the public. There is, of course, another solution. Government need not be tyrannical under government ownership—for we can always starve.

Increasing Reliability of Mechanical Equipment

A RATHER significant indication of the increased confidence the coal producer has in the machinery end of his operation is shown in some figures taken from the mine inspectors' reports of Pennsylvania. It was customary, even as late as 1910, to allow a large factor of safety with any mechanical equipment, and especially with mine pumps, since any failure of these would occasion serious results.

In more recent years, however, the higher grade machinery, as well as the coalman's increased knowledge and confidence in it, has tended to reduce this safety factor decidedly. The mine inspectors' reports, for instance, show that during the period 1910 to 1915 the capacity of the mine pumps in the bituminous field of Pennsylvania only increased from 510,000 gal. per minute to 727,000 gal. per minute, or 18 per cent., while the actual water handled during this period increased from 300,000 gal. per minute to 418,000 gal. per minute, or 40 per cent.

This increased confidence in the reliability of their mechanical equipment has been accompanied by a substantial increase in the capacity of the individual units. In 1910 the average number of gallons per minute handled by each pump was 184, and the same figure for 1916 was 256.

The increased use of machinery and mechanical equipment in the mining industry is showing a growth that the well-informed operator is watching carefully. In fact, with labor costs continuing at existing high levels, the operator who fails to adopt all possible means of replacing man-power with machinery may find himself driven out of business.

Since and including 1913 Great Britain has bought 27 billion dollars worth of goods and sold 16 billion, incurring obligations of 11 billion dollars. The pound sterling, the value of which never changed, was $4.87. It now is $4.57. No wonder Great Britain is not keen to plunge any further into debt.

Dig Deep!

THE vital necessity for American industry at this moment is the success of the Victory Liberty Loan. Success of this loan is required for the maintenance of our national prestige. That goes without saying. The United States pays its debts, pays them quickly, fully, generously, and particularly does not allow the expenses of a war to drag on in endless claims long after the war is over. Four loans are already out. In order to enhance their value, the present loan must be heavily oversubscribed.

So much for the national side of this loan. The industrial aspect strikes home just as forcefully. We are no longer standing at Armageddon; the tide of battle has flowed with tremendous force in our direction. Now we are on another tide, which also must be taken at the full, or this country will lose all it has to gain of the benefits of peace. The industrial tide is setting in.

Before industry can function without friction several things have to be accomplished. First, the finances of the country must be in a settled state. This cannot be until the loan is a success. While money is withheld from its proper use by the Government it cannot be freely loaned to individuals; the risk of taxation, of new flotations, is too great. Second, the men who were in the army must be quickly taken into the fabric of industry. A floating population of discharged soldiers, or even the keeping of a million and more soldiers under arms, will destroy the even balance of industry, affecting capital, as much as it affects labor, with a sense of insecurity. Finally, the war industries of the country must be turned to other purposes.

For these things, as well as for the care and education of wounded and crippled men, the Victory Liberty Loan is the essential. It comes at a time when the prospects of expansion for American industry are brighter than ever. With Europe begging for the products of our fields and factories, it would be folly for us to hold back. It is possible for America to take the commanding position in the world of finance and industry. But no country can command which cannot settle its own affairs. To settle our affairs we have, first and above all, the Victory Liberty Loan. We must dig deep into our money pockets, or we shall never dig at all in the industrial mines of the world.

THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

How can we carry over to the mine worker, who is bone of our bone and flesh of our flesh, that he is the person of all others who wants more than anybody else? The rest of the world is satisfied with the eight-hour day, the mine worker wants six hours. Others are content with a 5½-day or a six-day week, the mine worker wants his week to be of five days and yet he asks for more and more pay.

When he realizes that everyone else has to pay him how can he make these demands, except on the ground that he has a harder time than other people or more risk than the generality or loses more time on his way to work or has some other unspecified or unspecifiable disability? The first statement—that his work is unusually hard—does not seem to be true or why is there an equal scale inside the mine and on the surface. As to the second count, it is true there is some risk in mining. It is partly compensated by legal provision, but after all it is not so great as some people think. It deters almost no one from entering the mines, and its importance is mainly apparent because it has been emphasized statistically whereas other industries competing for the same labor have had no statistics on which the public could base an indictment.

HAS MINER RIGHT TO SHORTER DAY THAN OTHERS?

As for the time needed to reach the working face that is usually met in big mines by the man trip, and it is fair that it should be so wherever the underground distance to the working face is over a mile. The day man is quite generally getting pay for all the time he is at the plant. He gets a full eight hours for eight hours corporeal presence regardless of whether he is working or walking or merely gathering up his tools. The miner does not work eight hours for the most part, and if he does it is because he elects so to do. He can easily let the eight hours cover the trip in and out of the mine.

So there is little reason for the mine worker's insistence on short time, especially in this country, except as the mine worker makes it a temporary practice to fill a temporary need. The general Industrial Conference in Great Britain has just established the eight-hour day. Yet at the same time the Sankey committee has promised to the privileged mine worker the seven-hour day to date from July 16 and the six-hour day from July 13, 1921. But that does not satisfy the mine worker. He wants wage increases also and big ones, and in America he wants the six-hour day now and forever hereafter and wage increases also.

SHORT TIME AS UNFAIR AS SHORT WEIGHT

On Mar. 31 we read that the South Wales miners reject the promised *six*-hour day (to which indeed there is a small qualification) an increase in wages of 50c. a day, and a voice in the management. On Apr. 7 we read that the Industrial Conference provides throughout England an *eight*-hour day, a national minimum wage, complete and unrestricted recognition of the trade unions, responsibility of the State for the unemployed and a National Industrial Council.

This is hailed as a Magna Charta Libertatum by the British public. The mine workers will have nothing to do with such a document. They would have the industrial workers of Great Britain work for them eight hours while they work for them in return only six hours a day. It is not a square deal. Can it be that the miners of Great Britain, after whom our miners are trying to pattern, are not square and don't pretend to be? This cannot be believed. The probabilities are that they do not understand the implications of their actions. They do not realize that there is no one so mean and miserable in the slums of the British cities, no farmer's laborer however humble, that they are not robbing by the fact that they give them short time in return for a day of eight hours.

A short day, like a short weight, is an abomination that rich and poor should hold in abhorrence. The short-time worker, rich or poor, robs the public of service. A man is only faithful to his trust when he plods along as unwearyingly as his fellow worker. He cannot take up his tools and quit at 2 p. m., when his neighbor works for him till 4 p. m. The miner should play the man, and when time is reduced it should be reduced everywhere and not in one occupation alone.

Apparently some of the anthracite miners of this country do not like the provision of the union that they may not work on idle days. They say they will strike if they are not allowed to prepare coal when the breaker is idle. It is to be hoped that the public will soon make this dispute between miners and other mine workers purely academic by providing work for 6 days in the week.

Contrary Currents in Hard-Coal Region

On Apr. 1 Christ J. Golden was formally inaugurated as president of District No. 9, United Mine Workers of America, a district which covers the Schuylkill field of the anthracite region of Pennsylvania. In connection with the inaugural ceremony came one of the greatest labor demonstrations ever held in the lower end of the coal fields. In his inaugural address, President Golden supported the recent demands enumerated by National President Hayes, in which he demands a six-hour day for the miners and a substantial wage increase.

The mine workers of Pine Ridge and Laurel Run Collieries of the Hudson Coal Co., in Luzerne County, recently called a strike when the grievance committee of the company and the officials of the concern failed to reach a settlement over a minor grievance. As a result the collieries are not working.

The strikers do not have the sanction of the organization because they acted before notifying the district officers. From what can be learned, it appears that the cause of the trouble is alleged partiality shown a member of the grievance committee, because of his activity in organization affairs. It is fully believed that the difficulty can be readily handled.

In the Lehigh region, the miners have served notice that they will tie up the Beaver Brook colliery indefinitely unless they are permitted to cut coal on idle days. The men claim that they are rushed in production on the days that the breaker works if they are not given a chance to get a supply on hand.

All the strippings in the Hazleton region operated by the Central Pennsylvania Quarrying, Stripping and Construction Co. started on a nine-hour basis on Apr. 1, following the winter's suspension. Heretofore the men worked ten hours, but the union asked for the reduced shift and this was agreed to without any trouble. The new schedule will remain in effect until next March, when the present contract will expire, the date being concurrent with the expiring of the anthracite mine wage schedule. Approximately 5000 employees are affected.

The Bolsheviki are still trying to get a firm hold in the Wyoming Valley, a place they have thought for a long time suitable for their operations. Many threats have been made against mine foremen and mine owners. On Mar. 31 James Dixon, mine foreman of the Delaware, Lackawanna & Western R.R. Co. Coal Department, was attacked by two men, being stabbed in the arm and in the breast. Three shots were fired at him, but without effect.

Don't Start Anything You Can't Finish

If the mine worker insists upon shorter hours, others will want them too. If as large a wage is paid the mine worker for the short day as for the long day, others will want to be paid in the same measure. As a result, the mine worker will have to pay more for all he gets. There's no such thing as doing less and having more. It's production, not wages, that really counts. Suppose Mrs. Mine Worker decides to work six hours a day with two days off, instead of 16 hours and no days off, where will Mr. Mine Worker be?

Beware of starting a fight you can't finish. Other working men and women have two hands as well as you.

DISCUSSION BY READERS

EDITED BY JAMES T. BEARD

Contents of Conical Water Tank

Letter No. 1—In looking over some back numbers of *Coal Age*, which are always interesting to me, my eye rested on an inquiry (Vol. 11, p. 113), asking for the method of calculating the depth of water in a conical tank, of given dimensions, when the tank is half-full. It was stated that the height of the tank in question was 18 ft., while its diameter at the top was 10 ft. and that at the boteom, 14 ft.

By a trial method, it was found that the depth of water in this tank when half-full would be 7.54 cu.ft., which is correct. However, I set to work and succeeded in developing a general formula, that gave a direct solution of such a problem. Believing that this is of interest to *Coal Age* readers, I submit the formula for consideration. It is as follows:

Let D = the larger diameter and d the lesser diameter of the tank and indicate its height by h. Then, if x = the depth of water in the tank when half-full,

$$x = h\left(\frac{D - \sqrt[3]{\tfrac{1}{2}(D^3 + d^3)}}{D - d}\right)$$

Substituting the given values in this formula, we find for the depth of water in the tank when half-full,

$$x = 18\left(\frac{14 - \sqrt[3]{\tfrac{1}{2}(14^3 + 10^3)}}{14 - 10}\right) = 7.54\ ft.$$

The use of this formula avoids solving such a problem by trial, as was suggested. CHARLES E. WALLER.

Allentown, Penn.

Drawing Pillars in Machine Mining

Letter No. 12—Allow me to add a word in the discussion having reference to drawing pillars with machines in rooms that have been opened to a width of 27 ft. and driven up 250 ft., under 200 ft. of cover and a strong sandstone roof, as suggested in the inquiry of "Operator," *Coal Age*, Jan. 2, p. 32.

In the first place, in driving rooms with the Sullivan shortwall machine to a supposed width of 27 ft., it will generally be found that the actual width is 30 ft. and the remaining pillars are far too thin for the proper support of the roof, to say nothing of drawing them back with machines. It has been assumed by one writer that these rooms are probably driven on 40-ft. centers, which would allow for pillars 13 ft. wide; but, even supposing that the pillars were 20 ft. wide, it would hardly be practicable to follow his plan when mining with machines, under the conditions mentioned.

Let me say then, assuming the rooms have been driven 27 ft. wide, under the conditions named, I would not use machines to draw back the pillars; but they should be removed by pickwork and not with machines. Coal cutters are too costly to risk in this work. The best miners should be employed and the work double-shifted, so as to draw the pillars rapidly.

Too much cannot be said in emphasizing the fact that it is a wilful waste of coal resources to open out work under the conditions described and in the manner mentioned. It would generally be found impracticable to recover more than but a small percentage of the coal remaining in the pillars.

Instead, the work should be planned to drive the rooms as narrow as possible and avoid paying yardage. This will require the use of comparatively little timber in the first workings, and the posts will not be crushed and broken but can mostly be used again. The rooms must be driven on such centers as will give a good width of pillar to be drawn back when the rooms have reached their limit. Such a plan will give opportunity to use machines on the pillars and a larger percentage of coal will be recovered.

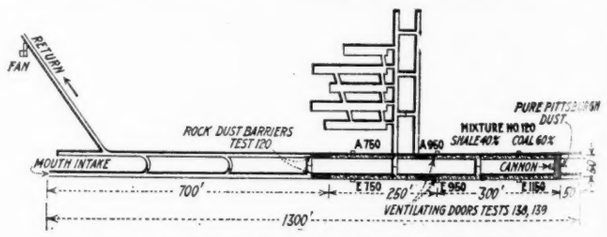
Looking over the district here, one can find hundreds of rooms standing full of timber left to decay, and many thin pillars that have had to be abandoned, because they could not be drawn with safety. I have gone into these rooms and drawn great quantities of timber that had been left; but the pillar coal cannot be taken out as the work is too dangerous, and the coal would not pay for moving the rubbish, which would have to be done before work could be started on the coal.

Linton, Ind. W. H. LUXTON.

Current Velocity re Mine Explosion

Letter No. 1—In the article of G. S. Rice and W. L. Egy, which appeared in *Coal Age*, Feb. 13, p. 308, entitled "Effect of the Velocity of Ventilating Current upon Mine Explosions," the writers refer to three tests, Nos. 138, 139 and 120, at the Bruceton experimental mine, to support their conclusions that air movements and ventilating conditions have no appreciable effect in starting and extending explosive combustion in mines.

The arrangement of the experimental mine at Bruceton is shown in the accompanying diagram. In all



EXPERIMENTAL MINE AT BRUCETON, PENN.

the tests regarding explosions, a cannon that was placed in an offset in the inby crosscut, 1250 ft. from the mine entrance, was employed as a means to initiate the explosion. The cannon was charged with 4 lb. of black powder and fired electrically from the outside of the mine.

The main features of the three tests mentioned were the following: Two heavy doors were located, one in the intake entry and the other in the return air-course, at points 300 ft. outby from the crosscut where the can-

non was fired. The door in the intake entry was hung to open inby, while that in the return air-course opened outby. When the tests were made, both of these doors were closed, so as to form a dust-charged explosion zone within the doors.

The dust charge, consisting of a 50 per cent. mixture of coal and shale, was distributed throughout this zone, at the rate of 4 lb. per ft. of entry. It is stated that, under these conditions, no difficulty was experienced in obtaining an explosion and the resulting flame or explosive velocities were high and the pressure strong, as indicated by the recording instruments that were installed for the purpose at several points on the intake and return entries.

Effect of the Inrush of Air Following the Firing of the Cannon

The conclusions of the writers are based on their assumption that there was no air current moving, in the immediate vicinity of the cannon, at the time the shot was fired. Let us see. Only a short time ago, it was stated by a mining engineer, in a previous discussion on the influence of the air factor in producing explosion in a mine, that "all will concede that an inrush of air follows the firing of a shot."

This statement has a particular significance in the present instance. Following the firing of the cannon in the Bruceton mine, the air was compressed in the space between the cannon and the intake door, which could only open inby; but the door on the return entry, opening outby, gave vent to an outrush of air. As a result, there was an area of depression at the cannon, followed immediately by the rush of the compressed air from the intake side toward the cannon, and causing the intake door to open inby and admit an inflow of fresh air into the explosion zone.

There can be no question but that this rush of air carried with it a probably greater amount of dust than the first outrush through the air-course. The effect of this difference is plainly shown by the presence of the greater pressure in the intake entry, which was due to a higher rate of explosive combustion. The records show that, in test 139, the pressure in the entry was nearly 50 per cent. greater than that in the return air-course, Notwithstanding this pronounced discrepancy, the writers of the article dismissed the matter with the remark that "the development of the explosion was roughly symmetrical in both branches."

Important Test Carefully Analized

Test 120 was made in the presence of members of the Mine Inspectors' Institute of America who were present in large numbers. The arrangement and result of this test are explained in great detail by the writers, who deemed it of special importance and who state that the ignition zone was prepared with pure Pittsburgh coal dust, consisting of 60 per cent. coal and 40 per cent. shale, distributed at the rate of 3½ lb. per ft. of entry. Barriers of various kinds limited the explosion zone at different points.

It is stated that "the explosion was a relatively weak one, with low velocities. . . . The development of the explosion in the two entries was quite similar, the velocities in the return air-course being a little greater than those in the intake entry. . . . The pressures developed were light, being 5 lb. at E 1150 and E 750, and 2 lb. at A 1150 and A 750." This description is followed by the statement, "Thus, there was practically no difference in the development of the explosion in the intake and return."

From the data given here, the writers have concluded that the rate of velocity of an air current moving toward the place of origin has no appreciable effect in the development of a dust explosion. To show that such a conclusion does not appear to be warranted by the facts of other tests, let me call attention to tests Nos. 9, 10 and 11, made at the Bruceton experimental mine, for the purpose of ascertaining the extent of pressure produced by the firing of the cannon alone, in the entire absence of coal dust and with the entries sprinkled throughout their entire length.

In test 9 all the circuit breakers, seven in number, were adjusted to operate at a 2-lb. pressure. When the shot was fired, only three of these circuit breakers, located within a distance of 300 ft. from the cannon, operated and the remaining four failed to work. In test 10, only two circuit breakers were used. These were placed about 100 ft. outby from the cannon and set to operate at pressures 3 and 4 lb., respectively. Both of these operated. In test 11, two circuit breakers were installed, in the same manner as in the previous test; but arranged, the one to operate at 5 lb., and the other at 6 lb. pressure. Neither of these operated.

What the Low and High Pressures Really Show

In my opinion, the low pressure of 2 lb., in the air-course, which resulted in test 120, was caused by the shot alone; and, notwithstanding the presence of flame observed in the air-course, the absence of additional pressure proves, also, the absence of explosive combustion. In the entry, however, the situation was different. It is evident that the pressure due to the shot should not be appreciably greater in the entry than in the air-course, the resistance of which caused the pressure. But, at Sta. E 1150, a 5-lb. pressure was registered, which fact clearly proves the occurrence of explosive combustion in that vicinity.

Let me urge, here, that if the velocity of the air movement toward and away from the cannon, at the time the shot was fired, is not a factor in the development of explosive combustion *in the entry*, and if its absence is not responsible for no such explosive condition *in the air-course*, how are we to account for the difference in these results? I submit that the claim of the writers that "there was practically no difference in the development of the explosion in the intake and the return," is not supported by the recorded facts, since there is apparently no evidence whatever of the development of explosive combustion in the air-course.

It is unfortunate that no attempt was made to check the conclusions of the writers, by repeating test 120, under the same conditions, except with the fan reversed, so as to make the air-course the intake and the entry the return. Allow me to suggest that such a test can still be made. I feel safe in the prediction that the resulting difference in pressure between the air-course and the entry will probably be more pronounced than in the test already made, and that the greater pressure will then be found in the intake air-course, which would unquestionably show the development of explosive combustion at that point. Should this be the case, the effect of air movement and ventilating conditions will be clearly and definitely proven to be important factors in the development of explosive combustion in mines.

John Verner,
Chariton, Iowa. Former State Mine Inspector.

Efficiency of Mine Officials

Letter No. 5.—If I have a hobby, it is efficiency, and I was glad to read the letter of William Gorman, *Coal Age*, Jan. 16, p. 159, inviting a discussion of the efficiency of mine superintendents.

When a man is called "efficient," I understand it to mean that he is possessed of the art of doing things in the right way, at the right time and with the least expenditure of time and energy. I think that most men will agree with me in this opinion.

Now, there are several things to be considered before one can say that a man is efficient, or that he fails in this respect. As Mr. Gorman suggests, many a good man has been hampered by conditions that are beyond his control. He may be handicapped by internal friction existing in his organization; and the results that he is able to accomplish must be judged in the light of these hindrances, and not by comparison with the work of another whose problem is simpler.

To obtain good results in efficiency, there must be the coördination of effort in the work of individual employees. A mine superintendent must have the coöperation of the underofficials, from the mine foreman all down the line and including the most humble worker. Not only this, but he must have the coöperation of the office and the higher officials whose duty it is to supply him with what is needed to enable him to accomplish the best results.

In other words, there must be the coördination of the work of every department. While it may be said that this is the efficiency of the organization rather than of the man, it will be admitted, readily, that no man can be efficient in his work without such coördination and coöperation on the part of everyone employed.

Efficiency Depends on Ability to Perform and Knowledge of the Game

In addition to the two factors mentioned, efficiency requires that a man be possessed of a certain degree of ability to perform, and the knowledge required to direct his efforts intelligently. I wonder if Mr. Gorman's barber didn't know more about coal mining than he knew of the tonsorial art. I have known men quick to learn a new trade; but does that show efficiency? Efficiency is revealed in the performance. The men who employed this erstwhile barber must have observed the characteristics he possessed and that fitted him for other duties. It was the recognition of such characteristics that induced them to put him in charge of their mine.

Ability to perform and a knowledge of the game, from the sump to the tipple, should be and are the requisites of an efficient superintendent. Who would select a man to boss a job who doesn't know, or who isn't sure, how that job should be done? In the operation of any property of any size, there are always a number of men employed who are not only well versed in the game but who possess, besides, the tact and diplomacy that fit them for a superintendent's job.

This fact should recommend that promotion, in an organization, should be within the grasp of these men. Such a policy will do more to hold an organization together and coördinate the work, than any other plan that can be adopted. I have been in the game a number of years and have seen all manner of men employed as bosses who were promoted from the ranks. Rarely have I seen jealousy shown when a man on the job was promoted through merit. Instead, it is generally recognized that he possessed the necessary qualities and deserved advancement.

In closing, let me say that, in every instance where efficiency is evident, each worker from the superintendent down is personally efficient. Organization makes the men a unit and all work for the common good.

Golden, Colo. Fred L. Serviss, Sr.

Letter No. 6—It has been a pleasure to read and study over the many interesting letters that have been written in *Coal Age*, and particularly those bearing on the efficiency of mine foremen and superintendents. The letter of William Gorman, in the issue, Jan. 16, p. 159, has taken me back over past experiences and recalls many interesting thoughts and incidents of my own observation.

The remarks that follow will bear more on the inefficiency of superintendents, hoping by that means to show by contrast what is required of a truly efficient man holding that office. My memory carries me back to the time when, as a plain miner, I observed instances where the company would spend money right and left for work that could accomplish no good end, save the employment of men needing to work. The undertaking would probably be done on the recommendation of a superintendent who had no practical knowledge of underground requirements.

Superintendents Without Practical Experience

It has been my lot to come in contact with some of these men. They remind me more of a young boy who runs wild and must have his fun, without a thought of where his next suit of clothes or next pair of shoes will come from. In other words, a superintendent of this class directs work, without stopping to *think;* or, if he thinks at all, it is not in the right direction. The reasoning of a plain, practical mining man falls on deaf ears. Such a one, as we say, will not listen to common horse sense regarding a proposed plan of mining, system of haulage, drainage or ventilation. He prefers to follow a plan of his own that may look well on paper but will seldom work in the mine.

My experience has taught me that the efficient mine official must get his men together, talk over a proposition and get their ideas, which will enable him to view the matter from every angle. The idea is to have a plain, old-fashioned, straight talk with all parties concerned, and adopt such a plan as will meet every requirement. When this is not done changes will have to be made later that are expensive, if indeed the entire plan does not have to be abandoned.

I can well remember working in a mine, some time ago, where the workings had been extended to a point that required the laying of a 4- or 5-in. pipe line, in order to drain a certain section of the workings. The superintendent was a man that had few practical ideas, and whose visits to the mine were few and far between. He was chiefly interested in keeping down expenses and making a good showing on the cost-sheet, each month.

While this superintendent may have had a vague idea that the laying of the pipe line mentioned would enable his company to take out a large tonnage for a considerable time to come, the one thought uppermost in his mind was what the expense would mean on the showing of his cost-sheet for that month. As a result, he made

this necessity of purchasing a few hundred feet of 4- or 5-in. pipe the excuse for his recommendation to abandon the mine.

Without further investigation, on the part of the company, the order was given to pull the tracking from rooms and entries, and take out all equipment that could be moved. In other words, the mine was henceforth and forever abandoned. The tipple was removed and the surface plant transported a mile further, around the side of the mountain, to another opening that had been made in the top vein of coal. Here the superintendent set men to work to clean up the entry and put down a slope to the lower seam, which was the same that we had just abandoned in the old mine.

A Foreman After the Superintendent's Own Heart

About this time, a change in mine foremanship took place. The new foreman was a man very much after the superintendent's own heart. His main idea was to get out cheap coal. I need not add that six months later this mine was shut down, for the reason that it was not paying expenses.

Now, notwithstanding the fact that $65,000 to $75,000 had been spent in opening and equipping this mine, orders were again given to pull everything movable and set up the plant at another opening, about a mile further around the mountain, at a place where the output had been 900 tons of coal a day. There, the entry was cleaned up and three more slopes were sunk to the lower seam, which was the same seam of coal worked in the two previous openings.

It is not possible for me to attempt to describe the superintendent's thoughts. To me, a practical miner, the entire proceedings appeared as boy's play. A few years later, the same company went into the hands of a receiver, and every practical mining man will say that this was the result of employing inefficiency in the practical work of mining coal.

Let me say, in closing, what has already been remarked in one of the letters I have read, that the most disagreeable thing to a mine foreman who is practical, is to be compelled to work under the instructions of an inefficient and unpractical mine superintendent. I am sorry to say that it has been my bad fortune to experience this difficulty in more than one instance.

As long as things go well, and the coal keeps moving, the foreman is all right in the eyes of the superintendent. But, when conditions change, as they ever will in coal mines, the superintendent lays everything to the foreman and suddenly charges that he is "a most inefficient man." Too often, there is no investigation made by the company to ascertain the actual facts. The increased cost of production is the one thing that blinds the eyes of the company to everything else, and the mine foreman is the man who must stand the blame.

Pruden, Tenn. EXPERIENCE.

Efficiency in Firebossing

Letter No. 10—In the discussion of this subject, kindly permit to say that I do not agree either with those correspondents, who take the position that a fireboss should never, under any circumstances, be called upon to do anything else than his own particular work; nor yet with the idea advanced by Edward H. Coxe, *Coal Age*, Jan. 23, p. 199, that "a fireboss will often have time to busy himself looking after a pump, laying a piece of track or setting needed timbers.

From the trend of Mr. Coxe's letter, one is led to believe that he has never performed the work of firebossing himself and does not fully appreciate the dangers of the situation.

The mining laws of Tennessee provide that all mines, generating gas in sufficient quantity to be detected with the safety lamp, are to be classed by the chief mine inspector as "Class-A mines," and must be examined by a certified gasboss (fireboss). The law further provides that this inspection must be made within three hours immediately preceding the time for the men to enter the mine for work.

Imagine, for a moment, the arduous duties of a fireboss who must go into the mine at 4 a.m. and proceed, alone, to explore the dark recesses of the mine, entering many dangerous places and climbing falls, lighted only by the dim flame of his safety lamp.

Even one who has not performed this task can imagine that it is not a pleasing job, and yet it is suggested by this writer that, after the fireboss has thus braved the dangers of the early morning alone, in his examination of the mine, he must finish out his shift by laying track, timbering, or running a pump, in common with other workers in the mine.

Here, in Tennessee, it is the custom for the fireboss when he has completed his morning examination, to notify the mine foreman in regard to the condition of the mine and explain the nature and location of any dangers that he may have found. Also, he informs the miners working in places that he has found to be dangerous that they must not proceed to work until their places are made safe. At times, he will assist the foreman in arranging the work for the day, by giving him any information in his power regarding the condition of the section or sections of the mine he has examined.

Standard of Firebossing Must Not Be Lowered

Speaking of the efficiency of firebosses, the work in their charge is of such a nature that the man who undertakes it should be the most efficient man in the mine, next to the foreman. The task and its duties should be so arranged as to make this position attractive to men who are capable and efficient. But, if the policy advocated by the writer to whom I have referred is to be followed, the result will surely be to lower the standard of firebossing, which would be a menace to the safety of the mine.

A few years ago, the Board of Mine Examiners, in Tennessee, concluded not to issue a fireboss certificate, on the ground that the only mines requiring the employment of a fireboss were those of "Class A," generating gas. They held, therefore, that a man capable of performing the work of fireboss should hold a Class-A certificate. This action of the examining board has had the tendency to raise the standard of firebossing in this state, both in respect to qualification and compensation for the work.

I have known places where the fireboss was only required to make the round of the mine and enter his report in the book kept for that purpose and then his work was done. I have known other places where the fireboss, upon completing his morning examination and reporting the condition of the mine, would continue to assist the foreman for a few hours in the early morning and then be relieved from further duty for the day.

I consider that it is the proper work of a fireboss to assist the foreman, in any manner that lies in his power, and to give him all the information he can regarding

the condition of the mine and work that requires immediate attention. I do not think, however, that the fireboss should be required to re-enter the mine to perform the work of timbering or tracklaying, or to serve in other capacities except those I have mentioned.

Briceville, Tenn. U. S. WILSON.

Panel System of Mining

Letter No. 3—Kindly permit me to refer to the inquiry of R. J. Pickett, *Coal Age*, Feb. 27, p. 419, regarding a change that he proposes to make in his present panel system in his mine. Allow me to suggest that it would seem that Mr. Pickett has not taken into consideration the comparative costs when considering this plan. Without meaning to criticise his judgment, I may say that the expense of the proposed plan would be much greater, especially in regard to the yardage paid for driving entries and crosscuts.

In my opinion, the difficulties he mentions in regard to bad roof, ventilation and drainage must be overcome by some other means. At present, he is driving one pair of entries and turns 20 rooms off of each entry or 40 rooms in all. In his proposed plan, he would drive two 12-ft. entries and two 18-ft. places for air-courses, in getting the space for 40 rooms. In doing this, even if he paid no yardage for driving the 18-ft. place, he would have the same yardage to pay in driving the 12-ft. entries as before and, in addition, he would have to pay extra yardage, in driving two lengths of panel entries 268 ft. each, with their crosscuts, besides twice the number of crosscuts on the butt headings. This would make a considerable increase in yardage, which must be paid for at the rate of $1.12 per yard.

In addition to the increased expense for yardage, it will be necessary for him to junk all the right-hand switches that he is at present using in the rooms driven toward the main heading. His proposed plan calls for left-hand switches only, since rooms are driven only off the 12-ft. entries, in each pair of butt headings. An item that is worth considering, also, is the upkeep of the 18-ft. air-course, which I assume will cause much trouble and expense because of the poor roof.

SOME HELPFUL SUGGESTIONS

Allow me to make one or two suggestions which are as follows: First, reduce the width of the 12-ft. entries to 8 ft., which will increase the width of the entry pillar from 18 to 26 ft. This should prove a great help, under the poor roof conditions he mentions.

Again, while turning the rooms on the same 40-ft. centers, I would widen out to only 22 ft. This would leave 18-ft. pillars between the rooms, which would afford three 6-ft. cuts with the machine when drawing back the pillars. Here, also, increasing the width of the pillars and decreasing the width of opening, would give better roof conditions and the loss of coal would be less when drawing back the pillars.

In order to overcome the poor ventilation, a close examination should be made to discover air leaks in the stoppings and doors, which should be repaired wherever this is needed. All airways and crosscuts should be cleaned up and every obstruction to the flow of air removed, in order to give better ventilation in the workings. In regard to the development advancing slowly, let me suggest the double-shifting of the entries and the employment of the best entrymen obtainable.

Clinton, Ind. MINE FOREMAN.

Perils in Reconstruction

Letter No. 5—Speaking of the perils in the work of reconstruction following the war, *Coal Age* writers have recently reflected the worry that is present in the minds of many mining men, concerning the future of industrial America. They appear to recognize that, in the past, the labor of our great industries has been recruited from central and southern Europe. Foreigners have been brought here, not alone to promote our industrial expansion, but as a means to an end, the purpose being to keep down wages.

One of the effects of the war has been to decrease our great army of industrial workers, and the cry has been raised that labor is scarce. It has even been suggested, by a writer in *Coal Age*, there should be greater laxity in the immigration laws of this country, at least for the present. I cannot agree with this suggestion. America should not be made the dumping ground for the off-scouring of Europe.

Now, this is no reflection on the great mass of foreign labor that has come to our shores and which our immigration laws are designed to sift out and select only those who are capable of making good American citizens. While it is true that the foreign element in this country provides the most radical of our labor leaders, it is still true that the great mass of foreigners admitted to this country are loyal to its principles. The list of dead, on our honor rolls, is replete with the names of boys whose parents were born across the water. One of the perils in reconstruction work is, then, the assimilation of this class to make them Americans at heart.

PERIL IN THE LACK OF THRIFT AMONG ALL INDUSTRIAL WORKERS

Another peril that faces us is the lack of thrift in the labor classes, both foreign and home born. One has said that a laborer whose expenses, in support of his family, are $30 a week, will work six days in the week at five dollars a day, when he will only work four days in the week if his pay is raised to $7.50 a day. My belief is that there are men who will not work steadily at any wage; and the man whose pay is raised to $45 a week will find his expenses increase in the same ratio. My observation is that the wage earner is never so far ahead of the game that he can safely take a nap. We must study, then, to impress the idea of thrift on our workers.

The question of wage adjustment is another peril facing us. The prevailing opinion among mine workers with whom I have talked is that there can be no decrease in wages until the cost of living has been reduced, which is fair and just. Obervation inclines me to the belief that the great mass of workers want to be fair toward their employers; and employers are coming more and more to see that authority and position do not excuse acts of injustice.

No men or set of men can cry down organization of either capital or labor. If the one is needed, so is the other. The monthly men, working on salary, are an example of what results from a lack of organization. It is sad that we cannot place ourselves in the other fellow's shoes and consider all problems from his standpoint. How greatly this would assist us in solving these problems of reconstruction, which confront us, as captains or privates in the great industrial army of mine workers and mining men throughout the country.

————, Penn. PENNSYLVANIA.

INQUIRIES OF GENERAL INTEREST

EDITED BY JAMES T. BEARD

Estimating Percentage of Grade

Kindly permit me to ask how the percentage of grade is estimated, as I am in a tangle and have had many useless controversies on the matter. To illustrate my case, I have drawn a square having a diagonal line reaching from corner to corner. Suppose the two sides of the square are each 100 ft. in length. I calculate the length of the diagonal would be $\sqrt{100^2 + 100^2} = 141.4$ ft. Now, if this line represents a grade line, I am told that it would correspond to a grade of 100 per cent. I shall very much appreciate being put right on this question. STUDENT.

Morgantown, W. Va.

As was explained in *Coal Age*, in answer to a previous inquiry (Vol. 14, p. 756), there are two methods of estimating percentage of grade. One of these is based on the rise per hundred feet of *horizontal distance*, while the other is based on the rise per hundred feet of *pitch distance*.

In the case cited by this correspondent, the rise is 100 ft. in 100 ft. of horizontal distance. Therefore, estimating the grade on horizontal distance, the incline represented by the diagonal of the square illustrates a grade of 100 per cent. A 25 per cent. grade would be a rise of 25 ft. in going 100 ft. of horizontal distance. In this method of estimating, the grade is always the rise in 100 ft. of horizontal distance.

However, by the second method, when estimating the grade on pitch distance, the grade referred to in this case would be $100 \div 141.4 = 0.707$, or 70.7 per cent. Either method is correct, the first being used in fairly flat seams, while the second is more often used in steeper seams where the measurements are taken on the pitch. We can do no better than to refer this correspondent to the excellent letter of Richard Bowen, discussing this question in *Coal Age*, Jan. 9, p. 70.

Centrifugal-Pump Motor Heats

At the mine where I am employed, we are operating a centrifugal pump. The pump is located at the foot of a slope 200 ft. long and having a pitch of 40 deg. A 20-hp. motor is used for driving the pump, the speed of the motor being 1700 r.p.m. There is a 4-in. discharge and 5-in. suction, the suction pipe being 20 ft. long and the discharge the length of the slope or 200 ft. The pump works all right when using the 5-in. suction, but gets overheated and starts to smoke when a 4-in. suction is used. Please explain the cause of this overheating of the motor, also explain the method of calculating the horsepower required to drive a centrifugal pump. PUMPER.

———, Penn.

Centrifugal pumps are designed to give the best results or develop the highest efficiency when the head under which the pump must operate is proportionate to the required discharge, the latter varying as the square root of the head. For a head of, say, 80 or 90 ft., the velocity of discharge may be estimated at about 12 ft. per sec., to enable the pump to develop the highest efficiency in its performance.

On this basis, it is easy to see that a pump designed to work under a given head must have a diameter of discharge portal in proportion to the head in order to enable it to handle any given quantity of water with equal efficiency. When such a pump is required to work under a greater head than that for which it was designed, there is an overload thrown on the motor, which causes it to heat.

In the case before us, the pump is discharging up a slope 200 ft. long and having a pitch of 40 deg. The static head on this pump is, therefore, $200 \times \sin 40° = 200 \times 0.6428 = 128+$ ft. Likewise, the suction head, for the same slope, is $20 \times 0.6428 = 12+$ ft., which makes the total static head on the pump, say, 140 ft.

To this static head must be added the friction head caused by the flow of water through a 4-in. discharge pipe, say 220 ft. long, to make some allowance for the friction in the suction lift. Assuming the proportions used in designing centrifugal pumps, the friction head h_f (ft.), for a length of pipe $l = 220$ ft.; a rise, $h = 140$ ft.; and a diameter, $d = 4$ in., may be calculated thus,

$$h_f = \frac{0.7l}{d\sqrt{h}} = \frac{0.7 \times 220}{4 \times \sqrt{140}} = \text{say, } 11 \text{ ft.}$$

The total head under which the pump is operating, in this case, is then $140 + 11 = 151$ ft. Roughly estimated, a No. 4 centrifugal pump, or one having a 4-in. discharge portal, when operated by a 20-hp. motor at its full capacity, would develop its maximum efficiency under a head of about 95 ft.

Approximately, the horsepower required to operate a centrifugal pump under conditions that will develop the maximum efficiency of the pump may be calculated by the formula.

$$H = 0.00134d^2\sqrt{h^3}$$

In this formula, the h is the total head against which the pump must operate and includes the static head and the friction head; and d is the number of the pump or the diameter of the discharge portal. The formula also assumes that the diameter of the column pipe is equal to that of the discharge portal of the pump, both in inches, multiplied by four-ninths of the fourth root of the head expressed in feet, which conforms to the best pumping practice.

In answer to the question as to what is the cause of the overheating of the motor when a 4-in. suction is used instead of 5-in. suction, it can be said that the friction head is increased, by this change in the suction lift, about three times what it was in that lift, or, say nearly 5 ft. Judging from the data given, it appears that this pump is operating under a head greater than that for which it was designed and developing a very low efficiency.

EXAMINATION QUESTIONS

EDITED BY JAMES T. BEARD

Miscellaneous Questions

(Answered by Request)

Ques.—What are the dangers incidental to the operation of haulage on a steep slope and how would you guard against them?

Ans.—Haulage on a steep slope is subject to the following dangers: Cars may get loose at the top of the slope and run down the incline; the haulage rope or car couplings may break, allowing the trip or a portion of it to run back down the slope; men may be caught and injured or killed in attempting to travel up or down the slope; if the track is not well secured, danger may arise from its tendency to slip downhill, breaking a joint or otherwise dislocating the track and making a wreck possible. A wreck may also be caused if the empty trip is permitted to run down the slope with too great a speed.

To guard against these dangers, the top of the slope should be protected by suitable safety devices, such as safety blocks and automatic derailing switches to prevent cars running down the slope uncontrolled. A drag bar should be attached to the rear end of each trip hoisted. The haulage rope must be of sufficient strength for the load hauled, and inspected regularly at frequent intervals. All car couplings must be carefully made and have the required strength. These also should be inspected regularly and discarded when worn. The same is true also of the coupling pins and drawbars on the cars. The haulage rope should be recapped at least every six months or as often as may be necessary, as this is the weakest point in the rope and must be closely watched.

Men must never be permitted to ride on loaded trips or to travel the haulage slope when going in or out of the mine. The speed of haulage on a steep slope should be regulated not to exceed 8 miles per hour, or 6 miles per hour when hoisting or lowering men. The track in a slope must be well laid and secured from slipping downhill, and inspected regularly and cleared of all obstructions, such as coal or dirt that may fall from loaded trips. For the protection of the men working at the foot of a slope, there should be refuge holes cut in the rib and available for use in time of need. There should also be provided a good signal system and telephone or speaking-tube connection between the foot of the slope and the engine room.

Ques.—How would you protect a miner working at the face of a steep slope when hoisting operations are in progress?

Ans.—Refuge holes should be cut at frequent regular intervals in the rib, and a drag bar or "dog" attached to the rear of every loaded trip when it is being hoisted. As a further precaution men working at the face of a steep slope should cease work while the trip is being hoisted.

Ques.—What safety devices would you expect to find at a well-equipped shaft and on the hoisting machinery connected therewith?

Ans.—The top of the shaft should be protected by automatic safety gates arranged to rise and fall with the cage as it reaches and leaves the landing. The cage must be provided with a substantial hood or cover to protect men who are riding on the cage, from any loose material that may chance to fall into the shaft. The cage must also be provided with good safety catches operated by a strong spring. The winding drum of the engine must be provided with a powerful brake and there should be an indicator in the engine room, arranged to show the position of the cage in the shaft. In addition to such an indicator, the hoisting rope should be marked in a way to show the near approach of the cage to the upper landing to avoid danger of overwinding.

No engineer should depend entirely on the indicator to show him the correct position of the cage in the shaft, but must watch the marks on the hoisting rope as well. As an extra precaution against overwinding, many well-equipped mines have an automatic device that shuts off the steam when the cage has reached a certain position in the shaft; and, at the same time, the brake is applied to the drum to prevent the cage from being drawn into the headsheave.

Ques.—What tests would you make to assure yourself that these devices were in good condition?

Ans.—The safety devices requiring special tests other than a close inspection are the safety catches on the cage and the overwinding devices. In order to test the working of the safety catches, it has been suggested loading the cage and cutting the rope, or otherwise adopting an arrangement that will permit the cage to fall suddenly in the shaft, and observing the action of the catches to see if they arrest the fall of the cage. An overwinding device should, likewise, be subjected to the practical test to ascertain if it will properly perform the service intended.

Ques.—What is the horsepower of a pair of haulage engines, the diameter of the cylinders being 18 in., stroke, 32 in., number of strokes per minute, 30, pressure of steam, 40 lb.? The engine is geared as follows: The crank is connected to a shaft containing a pinion with 15 teeth, which drives a spur wheel having 75 teeth. On the same shaft containing this spur wheel is a pinion with 20 teeth, which drives a spur wheel on the drum shaft with 80 teeth.

Ans.—Since no mention is made of the cutoff in this engine, it may be assumed that the 40 lb. steam pressure is the mean effective pressure in the cylinder. The area of each cylinder is $0.7854 \times 18^2 = 254.47$ sq.in. The indicated horsepower developed in each cylinder is equal to the continued product of the mean-effective pressure in the cylinder (lb. per sq.in.), length of stroke (ft.), sectional area of the cylinder (sq.in.) and the number of strokes per minute. The horsepower is independent of the gearings, which need not be considered in this case.

$$I.hp. = 2\left(\frac{40 \times 2\frac{2}{3} \times 254.47 \times 30}{33{,}000}\right) = say\ 50\ hp.$$

FOREIGN MARKETS AND EXPORT NEWS

EDITED BY ALEX MOSS

Coal Situation in England

The following account of the fuel situation in England is taken from a letter by C. W. Barron, which appeared in the Apr. 3 issue of the *Boston News Bureau*:

The economic foundation of England is coal. With coal she not only gives power to her ships, but economic balance to her trade. She exports coal to Argentina, or did before the war, and brings back the cheapest beef. Her ships carried coal for the round trip or could fill from English bunkers in ports around the world. You needed not to leave London to charter your ship and buy her coal supplies around the globe.

But England paid her coal producers an average pre-war wage of 6s. 6d. per day, or about $1.50. Measured by the day's work in the shift she paid 8s. 10d., or a little over $2 per day per working coal hand above and under ground. And per man there was never a ton of coal produced, only a fraction of a ton per man.

Higher Wages and Less Output

The war very nearly doubled the wages. The average in November, 1918, was 12s. 5d., or about $3 per employee, and 16s. 12d., or about $4 per man per shift. But the output per man diminished, due in part to poorer quality of employee as men were drawn off for the war, in part to the lengthening distances from the mining shafts, and in part no doubt to the labor union heresy of restricted output.

In South Wales the output per employee which had gone down from 269 tons to 243 tons from 1906 to 1913 fell to 224 tons in 1918. In this district labor cost per ton had more than doubled. Supplies had increased in cost per ton from 2s. 10d. to 8s. 10d. But it was the restricted output that troubled the country more than the cost, and Lloyd George in the fall of 1918 had to go personally to the coal-mining districts and stimulate the output with his inspiring addresses. He told the miners that they were the real fighters against the Huns and that more and more they must "heave coal at them."

When the armistice came there was another effort to increase the coal output, and 200,000 coal miners were given preference in demobilization. Other soldiers protested by riots. Coal was more sharply rationed than ever before in England, and the miners have now demanded a 30 per cent. increase in wages and a reduction from eight hours to six hours per day.

No Exports

A coal commission is now daily taking testimony, receiving volumes of statistics, sifting out the facts, and promises a report before April 1. If the demand is complied with it will add 9 shillings per ton to the price of coal, and this in turn will add 10 per cent. to the cost of steel making.

At today's prices, neither coal nor steel can be shipped abroad in competition with the United States, except by Government subvention or assistance in transportation.

There are one million men and two hundred thousand boys (under sixteen) and women who draw their wages from coal-mining, and of two hundred and seventy million tons produced in normal times, one hundred million tons go into ships in the proportion of about 25 million tons for bunker coal and 75 million tons for export.

England faces the situation calmly and fully understands that English coal which cost in 1913 eleven shillings per ton at the pit's mouth now costs 18s. and will cost not less than 26 shillings if the demands of the miners are granted and Lloyd George tells Parliament that Pocahontas coal in Virginia, the best that America now can produce, is now costing but 11s. per ton at the pit's mouth.

The American Competition

How to compete in the future with the United States paying twice the wages, yet producing coal at about one-half the English cost, presents many problems. Bunker coal f.o.b. in English ports is costing today 36 to 37 shillings per ton, or about $9. It is of course a controlled commodity, the Government naming the price, raking off a profit, and paying not less than 6d. per ton as expense of control.

Nevertheless the price of bunker coal f.o.b. at American ports is $5, or less than 20 shillings per ton. If the Government keeps the control, and adds 9s., or $2 per ton, the cost of English coal f.o.b. becomes more than double the ship's cost per ton in the United States.

Can England put in coal machinery? The answer is that English coal veins run down to 23 in. in width while American coal seams run up to 40 ft. in width, and in the United States 16,000 machines cut 253 million tons of coal, while in Great Britain 4000 machines cut only 27 million tons. In many mines a large part of the miner's day's work is consumed in walking between the shaft and the distant coal face at which he must work.

"Nationalize the mines," cry out the coal miners. Nationalization of coal mines has been a cry in English politics for a generation. It has taken on a new phase of late —a Bolshevik demand in some quarters— that as the Government wants output, and this is more important than profit, let the Government buy the mines and give them to the coal miners, who will run them for output for the public and profit for themselves. The miners say: "We know our own slackers and if we had all the profit we would quickly throw out all the slackers." Thus does Bolshevism in practice propose to undo the philanthropy of its theories. The main response in England is: "A man in this country shall get what he pays for; stealing is not yet recognized."

Combination to Meet Competition

There is one sensible suggestion, and that is to nationalize the mines by buying out the 1452 coal owners of whom 434 produce less than 2000 tons a year, and by consolidation of interests and concentrated energies reduce the expense and enlarge the output. It is thus proposed under the form of a national trust to remove the waste of disjointed ownership.

It would be a singular outcome if England should turn to a trust combination to meet American competition where the economies of combination in trust are forbidden under the Sherman law and the legal decisions superimposed thereupon.

Combination of mines may afford some relief, but confiscation of all the royalties and mining operators' profits would not give one-half the increased wages demanded by coal men. Royalties are about 6d. per ton and the pre-war profits per ton were only 1s. The coal operators' profits have been expanded during the war to 3s. 6½d. But of the 60 cents per ton increase the Government in excess profits and income taxes takes the major part.

As near as can be estimated the total capital in the English coal industry, not including freehold realty, is 128 million pounds sterling.

The Controlling Factor

The British official record shows that in 1916 the worker in the United States produced 896 tons of soft coal per annum, and in anthracite mines 548 tons of coal per annum. This compares with 207 tons of anthracite per man per annum in the mines of South Wales and only 222 tons of soft coal per man per annum in South Wales.

The comparison shows more than four tons of soft coal for the American worker as compared with one ton of soft coal for the English worker. Many mines in the United States have a much higher production per man, but the average English production in soft coal ranges from 230 to 260 tons per man per annum.

The coal hearing occupies a page or two in the daily press. But neither from the hearing nor the press will you learn the supreme and controlling fact and factor, if there is to be an international coal situation.

Please don't ask me where I get the fact or the figures, for they are not in the possession of any government and they cost too much money to be otherwise than privately controlled.

But the fact is that in normal times the United States has a 20 per cent. surplus coal capacity. Now as the production in the United States is twice that of Great Britain, the United States has normally a coal capacity that is 40 per cent. of the strained and maximum coal capacity of Great Britain.

Definite Program for American Shipping

Declaring for private ownership and operation of the American merchant marine, with Government control of the maximum rates to be charged American shippers, the American Manufacturers' Export Association has adopted resolutions which outline a practical plan for utilizing the $2,500,000,000 fleet which the country will own at the end of 1920.

In February Senator Ransdell, in a speech before the Senate, called upon the business men of the country for concrete suggestions as to the disposition and operation of the vessels which the nation has built or is building. In that speech he stated that at the end of 1920, if present plans were carried through, the United States would have expended $2,500,000,000 for Government-owned boats, and would have a total tonnage of 19,000,000 under the American flag. He declared that thus far no definite program had been adopted for utilizing this immensely valuable national asset.

The views of the exporting manufacturers who must use these vessels are expressed in the resolutions of the American Manufacturers' Export Association, which comprises 1200 of the larger manufacturers throughout the country. As adopted by the Board of Directors of the Association the resolutions read as follows:

"The nation's foreign trade cannot be successfully developed without an American merchant marine able to transport American products as cheaply, as regularly and as efficiently as products of other countries are carried.

"Our naval authorities have declared that both for the training of American seamen, and for the necessary victualing and sup-

Hampton Roads Coal Exports

NORFOLK

			Cargo	Bunker
Lamberts Point				
Mar. 24	Ital. S.S. Adriatico	Gibraltar, for orders (Italy)	6,675	814
Mar. 25	Amer. S.S. Lake Cayuga	San Juan, P. R.	2,331	230
Mar. 26	Amer. S.S. Rijswijk	Barbados, B. W. I.	1,996	405
Mar. 26	Amer. S.S. Alapaha	Mollendo, Peru	2,187	970
Mar. 27	Amer. S.S. Ulysses	Cristobal, C. Z.	12,031	1,224
Mar. 27	Nor. S.S. Stavangeren	Curacao, D. W. I.	1,146	245
Sewalls Point				
Mar. 26	Amer. S.S. Moraine	Pernambuco, Brazil	2,979	654
Mar. 28	Amer. S.S. Garibaldi	Rio de Janeiro, Brazil	3,184	1,135
Newport News				
Mar. 25	Amer. Sc. J. G. Shaw	Guayanilla Bay, P. R.	1,019	....
Mar. 26	Amer. S.S. Camaguey	Acajutla, San Salvador	2,742	566
Mar. 27	Nor. Sp. Gantock Rock	Rio de Janeiro, Brazil	2,266	....
Mar. 27	Nor. Sc. Pusey Jones III	Sanchez, D. R.	497	....
Mar. 27	Amer. S.S. Barnstable	Sagua la Grande, Cuba	1,271	218

plying of the Navy when operating in foreign waters, an auxiliary merchant marine is essential. In fact, the Secretary of the Navy, in a letter to this Association, said: 'I feel that the proper enlargement, the influence, and the wise use of such a merchant marine is the biggest question now to be solved by the American people.'

"The establishment and maintenance of an American merchant marine is therefore a matter in which every citizen of the country is vitally interested.

"Be it resolved therefore that the Board of Directors of the American Manufacturers' Export Association, after consideration of the problem, recommend the following means of utilizing the ships now built and building by the United States Government to the end that a permanent and available American merchant marine may be established.

"First—All ships owned by the United States Government or building or contracted for by the Government, should be sold to American ship operators at the earliest moment after proper basis for such sale can be established.

"Second—The price at which these ships are sold should not exceed the cost of foreign-built ships of the same class and tonnage.

"Third—The Government should exercise control to the extent of establishing maximum rates.

"Fourth—Some guaranty should be given to operators of American ships that under certain conditions and for a limited time they will be reimbursed for losses sustained in handling business at competitive rates where the revenue is not sufficient to cover operating cost."

The provision that private ship operators must be guaranteed against operating at a loss on rates fixed by the Government is based, it is explained, upon the fact that our present navigation laws compel the payment of higher wages upon American ships than are paid on the ships of any other nation.

Furthermore, to properly expand the country's export trade, new ocean routes must be established which cannot be profitable until a larger volume of trade has been built up.

The Export Association would guarantee private ship owners against loss while these conditions continue, but its resolution is framed to prevent a subsidy resulting in excessive profits. Private operators, under this last provision, would be guaranteed against unavoidable losses, but their profits would still depend solely upon their own efficiency and enterprise.

Italy's Coal Needs

That Italy needs 200,000 tons of semi-bituminous coal from the United States each month for at least a year, and that American coal producers have an opportunity to continue to hold whatever trade it may secure, is the declaration of Francesco Quattrone, the High Commissioner for Italy in this country.

Mr. Quattrone also stated there was no truth, so far as he knew, in the dispatches received in this country to the effect that Italian orders for 4,000,000 tons of American coal had been placed and that shipments were to begin shortly. He believes, however, that there is a splendid opportunity for operators in this country to secure new markets and that the coal is sadly needed if Italy is to meet the reconstruction period successfully.

The fuel situation in Italy is serious. Owing to conditions in England, that country finds it impossible to supply Italy with fuel as in former years. Italy is unable even to get sufficient coal to meet her minimum requirements for the railroads and industries, the normal needs being about 1,000,000 tons a month. At present there are no supplies of coal on hand, factories are suffering from the lack of fuel, while other industries are partially closed down.

Every effort is being made to meet the situation by encouraging the production of lignite and the burning of the best woods of the forests, which will of necessity create a shortage of lumber for building purposes.

During the war, said Mr. Quattrone, it was recognized that Italy could not afford to have less than 600,000 tons of coal a month. This tonnage was kept up for some time, but for the past several months has shown a decrease, so that in March of this year less than 400,000 tons were received.

The ports of Aveiro and Caminha, which had been closed by order of the Portuguese Government, have been reopened to navigation.

United States May Become Largest Coal Exporter

The serious complaints of a coal scarcity in Great Britain coupled with the proposition recently presented in Parliament for an investigation by a commission to be created by the King lends interest to figures compiled by the National City Bank of New York regarding the world's coal production in the last half century and the relative share of Great Britain and the United States therein.

The figures show that the coal output of great Britain grew from 124,000,000 short tons in 1870 to approximately to 255,000,000 in 1918, while the output of the mines of the United States grew from 33,000,000 tons in 1870 to 685,000,000 tons in 1918. The British output in 1918 was double that of 1870. The United States output in 1918 was 23 times as much as in 1870. In all parts of the world aside from Great Britain and the United States, the output grew from 80,000,0000 in 1870 to 500,000,000 tons in 1918, or about six times as much in 1918 as in 1870.

The United States produced about 14 per cent. of the world's output of coal in 1870, 80 per cent. in 1880, 28 per cent. in 1890, 32 per cent. in 1900, 39 per cent. in 1910, 48 per cent. in 1918. Curiously, however, the United States, although turning out two and a half times as much coal as Great Britain, has not been until very recently an exporter, in any considerable sense, of coal. Our exportation of coal had never reached as many as 20,000,000 tons prior to 1913, and even in the highest war record of exports only reached 26,000,000 tons in the fiscal year 1918, the highest record ever attained. On the other hand Great Britain's exportation of coal was in 1913, 72,000,000 tons, or nearly four times as much as that of the United States in that year, in 1910 62,000,000 tons against 13,000,000 tons exported by the United States.

Growth in production in very recent years has been much more rapid in the United States than in Great Britain or Germany, or in fact any other part of the world. Our own production of coal, according to the bank's statement, grew from 270,000,000 tons in 1900 to 685,000,000 in 1918, while that of Great Britain was, in 1900, 252,000,000 tons, and in 1918, 255,000,000 and that of Germany 165,000,000 tons in 1900 and 260,000,000 in 1915, the latest year for which figures are available. In the remainder of the world output in 1900 was only 160,000,000 tons, and in 1918 230,000,000 tons.

The possibility of the United States becoming a large exporter of coal and perhaps the world's chief coal purveyer looks comparatively easy when the relative supply of coal is compared in the various sections of the globe. The world's total available stock of coal is 7,397,553,000,000 metric tons, of which the United States has 3,838,657,000,000, or 52 per cent. of the world's total. Canada ranks next to the United States, with 1,234,260,000,000 tons; China, 995,587,000,000; Germany, as it existed in 1913, 423,356,000,000; Great Britain, 189,533,000,000; these figures being supplied by the Geological Congress held at Toronto in 1913.

Miscellaneous Notes

The National Bank of Denmark is raising its discount rate from 5 per cent. (at which rate it has been since July, 1915) to 5½ per cent.

Coal cargoes passing through the Panama Canal during the week ended Mar. 15 are as follows: Norfolk to Pearl Harbor; Norfolk to Arica; Norfolk to Puget Sound; Philadelphia to Pearl Harbor; Norfolk to Antofagasta; Kingston to Callao.

Copenhagen harbor authorities are proposing a budget for 1919 in which the fees are to be increased to cover the expenses. The 100 per cent. increase now applying will be in force for all of 1919 for all fees levied on imported goods, while the increased quay and mooring fees will only be maintained provisionally for six months of 1919. It is estimated that at the end of 1919 the harbor authorities will have a cash fund of over $6,000,000.

Industries in Greece were severely crippled during the war for want of fuel and labor. They have, however, during the months of December, 1918, and January, 1919, received a stimulus in the freeing of some coal and other fuel by the local ministries and in the granting by the military authorities of long leaves of absence to mobilized men.

Coal and Coke Exports in February

Exports of coal and coke, as reported by the Department of Commerce for February, 1919, and the figures for February, 1918, as finally revised, are as follows:

(In Tons)	February 1918	February 1919
Coal		
Anthracite	227,319	221,018
Bituminous	919,999	713,951
Exported to:		
Italy	1,000	4,933
Canada	578,442	446,429
Panama	42,332	8,661
Mexico	12,967	5,142
Cuba	145,104	40,644
Other W. Indies	13,313	16,965
Argentina	22,609	38,993
Brazil	64,747	67,825
Chile	.....	49,056
Uruguay	2,755	12,007
Other countries	36,730	23,296
Coke	83,758	48,806

All imports of coal during February were from Canada. They aggregated 55,834 tons.

Foreign Freight Rates

W. W. Battie & Co.'s coal trade freight report for Mar. 31 states that freight market conditions have not altered during the week under review.

The Chartering Committee's rates are as quoted below:

Steam—Havana, $7.50, 600 tons dis.; Cardenas or Sagua, $9, 300 tons dis.; Cienfuegos, $9, 500 tons dis.; Caibarien, $9.50, 300 tons dis.; Guantanamo, $8.50, 500 tons dis.; $9, 400 tons dis.; Manzanillo, $9.50, 300 tons dis.; Bermuda, $9.50, and Bermuda, p. c. and dis. free, 300 tons dis.; Kingston, $9.50, 400 tons dis.; St. Thomas, $10, 500 tons dis.; St. Lucia, $11, 500 tons dis.; Santiago, $8.50, 500 tons dis.; $9, 400 tons dis.; Barbados, $11, 500 tons dis.; Port of Spain, Trinidad, $11, 500 tons dis.; Curacao, $10.50, free p. c. Curacao, 500 tons discharge. Rio, $19.50 net, 1000 tons dis.; Santos, $19.50 net, 1000 tons dis., or $21 net, 600 tons dis.; Buenos Aires, $18.50 net, 600 tons dis.; Montevideo, $19.50 net, 750 tons dis.; Pernambuco, $18.50 net, 500 tons dis. To Nitrate Range, $16.50 gross prepaid.

Sail (maximum)—Para, $15.50 net; Bahia, $18.50 net; Pernambuco, $18.50 net; Rio, $19.50 net.; Santos, $19.50 net; Rio Grande do Sul, $21.50 net, 400 tons dis.; Buenos Aires, $18.50 net; La Plata, $18.50 net; Montevideo, $19.50 net. To Nitrate Range, $16.50 gross prepaid.

England Losing Coal Contracts

Considerable comment has appeared in both the American and British press relative to the recent American contracts for export coal. Before the war England was able to sell coal far more cheaply than could the United States, not only in Europe, but in America. At the present time several large coal buyers who formerly purchased Welsh coal, are giving their orders to American firms. Thus, Teneriffe has contracted for 100,000 tons of American coal; Italy for 80,000 tons; France, 50,000 tons; and the Swedish Government 250,000 tons for the state railways.

It is said that the Central Brazilian Railway Co. has bought 600,000 tons of American coal at 144 francs ($28.80) a ton, which is reported to be below the present English price.

Would Embargo United States Coal

A deputation from the Nova Scotia Federation of Miners, it was announced at Halifax, N. S., on Mar. 31, will wait on the Government authorities at Ottawa soon to discuss with them the feasibility of placing an embargo on United States coal. Owing to lack of ships, several Nova Scotia mines have been closed and considerable unemployment is reported to exist, it is said, because of the curtailed market due to loss of the bulk of the St. Lawrence coal trade to American operators.

American bituminous coal is now said to be finding its way into New Brunswick through Quebec. At a recent informal conference between miners' delegates and members of the legislature, it was stated that the Nova Scotia coal mining situation had reached an acute stage.

COAL AND COKE NEWS

EDITED BY ALEX MOSS

Harrisburg, Penn.

Recognizing the demand from large employers of labor that ample time should be given for consideration of the many proposed changes in the Workmen's Compensation law, Harry A. Mackey, chairman of the board which framed the draft of the bill, at the opening of a meeting held on Apr. 1, announced that any public discussion of the merits of the bill at this time would be deemed unfortunate, for the reason that it might lead to acrimonious debate, eventuating possibly in serious misunderstanding.

The sensational statement was made at the conference, just before an agreement was reached, to hold another meeting to discuss the matter on Apr. 15, that Pennsylvania mines might be compelled to suspend operations unless the Federal Government shall change its plans for dealing with coal-producing companies. Henry I. Wilson, representing the Central Bituminous Operators' Association, asked for time to figure out what the amendments would cost the operators, and in this he was joined by the Pennsylvania Manufacturers' Association and Henry A. Gordon, of Wilkes-Barre, representing the anthracite operators. The labor people were against granting an extension of time.

In a statement issued Apr. 4 Governor Sproul declared that after a study of the anthracite situation, including the wage question, railroad rates and conditions in general, he had come to the conclusion that the increase of 10 cents a ton for five months beginning May 1, recently announced by the operators, is justified.

The governor attacked railroad rate inequalities, gave figures showing the cost per long ton of coal delivered on trestles in several eastern Pennsylvania cities, and said that the advance was necessary in order to maintain the wage schedule for miners and to prevent derangement in the trade. The governor also advocated the establishment of municipal fuel markets for the sale of coal at cost.

Uniontown, Penn.

Brought back to life after having been permitted to lapse for the duration of the war, the Coke Producers' Association, an organization of 35 merchant operators of the Connellsville field, is giving promise of growing into an active agency through which the Connellsville coke region may be represented in matters pertaining to the entire coke industry. The crisis in the present industrial uncertainty has resulted in binding the operators together into a compact body for their mutual benefit in working out a solution best applicable to the coke industry.

That solution is now being sought through a series of almost daily conferences among the region's leading producers. Virtually all of the largest independent operators have offices in Uniontown, or have representatives here, and it is a simple task to call them together in conference. It is expected that within a week or ten days a definite statement will be made by an appointed spokesman of the organization outlining the conclusions reached at the conferences.

Coal shipments down the Monongahela River during the first three months in 1919 almost doubled those of the corresponding period in 1918. The shipments for March alone were 24,274,000 bushels, an increase of 4,000,000 bushels over January and February. Combined, the shipments for the three months were 67,715,000 bushels as against 35,477,000 bushels during the first three months of 1918.

Charleston, W. Va.

Decreases in production during the last week in March featured mining conditions in West Virginia, these being traceable directly to embargoes which shut off the shipment of coal from the New River, Pocahontas and Fairmont regions. Indirectly, of course, there were slight decreases due to the general condition of the market. In contrast to conditions affecting eastern shipments was a perceptibly steady improvement in the demand from the west, as seen in an increased production in fields essentially engaged in shipping coal to that consuming area. The increases did not average over 3 or 4 per cent., but were highly encouraging.

Taking the state as a whole, production was much under 50 per cent., and mines were not operated as a general average more than two days during the week. Of considerable help in keeping up production were heavy navy shipments. While transportation facilities were much improved over the earlier part of March, the labor shortage became a little more pronounced, though not sufficient to interfere materially with production under present circumstances.

West Virginia producers are looking forward to the opening of the lake season by Apr. 15, when they anticipate an increased production. Renewal of contracts and the signing of new contracts, effective Apr. 1, is counted upon to give impetus to production in all the fields of the State.

Victoria, B. C.

"This year the coal mines of the northwest will not operate 40 per cent. of the time, which means a heavy expense for operators," stated James S. Ramage, head of the Continental Fuel Co. and the Hawkeye Fuel Co., recently in Spokane. "For some time," he continued, "there has been serious over-production of coal in Canadian and other districts from which Spokane City receives its supply. About 80 per cent. of the steam coal used here comes from the Canadian mines, and a serious situation has developed in that country as is evident by a recent report issued by the Workmen's Compensation Commission making the definite statement that cost of labor in producing coal is $2.60 a ton, which is above previous calculations and more than in other fields with which Canada competes."

As to the situation in western Canada in regard to coal production and trade, it is interesting to note the comments of Premier Charles Stewart, of the Province of Alberta, made recently to the Legislative Assembly of that Province. He pointed to the stored up surplus of 2,000,000 tons of coal and admitted that the position was a serious one, especially with the embargo taken off American coal and with production costs at a high level. The premier declared that the only solution of the problem was the reduction in the price of coal to the extent of at least $2 a ton, in order that American competition might be met. This reduction, he said, had to be achieved by cutting the price of production, though some slight decrease might be attained in freight rates. He believed that the difficulty might be remedied, at least in a degree, by lengthening the time of production, assuring the miners of steady work for a period of eight months in the year instead of but six months as at present. While Premier Stewart declared that he was against cutting wages, his remarks led to the conclusion that, with the lengthening of the period, the miners' daily wage would have to come down. He virtually admitted, however, that the Alberta Government was helpless in face of present conditions.

New York, N. Y.

The strike of harbor workers appears to be as far from settlement as ever. As a result of a conference held last Saturday night in the Hotel Manhattan between representatives of the Boat Owners' Association and the strikers' representatives, it was decided that the strikers' organizations would on the following Monday vote on a proposition involving an increase in wages, said to be 15 per cent., and a 10-hour day. The original demands included a larger increase in wages and an 8-hour day.

When the vote was announced late on Monday of this week it showed that the proposition was rejected by a vote of 300 to 29, the majority holding out for an 8-hour day. Several meetings have been held during the week but the strikers appear to be "standing pat" for at least the shorter working day.

The breach between the Tidewater Boatmen's Union and the remaining organizations in the Marine Workers' Affiliation seems to be broadening. The former organization accepted the terms of the boat owners early last week and broke away from the Affiliation.

The failure of the men and employers to come to an agreement concerning their difficulties is likely to prove serious to coal consumers here, should it continue much longer. With the decision of Governor Sproul of Pennsylvania sustaining the producers' announcement of an increase in prices it is expected that users of coal will want their next winter's supply put away.

It is expected that representatives of the United States Department of Labor, who have been endeavoring to bring about a settlement, will now make further efforts to effect an agreement and insist that the owners and strikers should consider the public and come to terms.

PENNSYLVANIA

Anthracite

Shickshinny—The Stackhouse Coal Co. on Apr. 1 ceased work for thirty days to permit the company to make needed repairs to the machinery. Several hundred men and boys will be thrown out of work.

Kulpmont—The Susquehanna Collieries Co.'s mammoth breaker at Scott colliery was menaced by fire which destroyed the carpenter, machine, repair and blacksmith shop immediately adjoining the breaker. The fire, caused by defective wiring, was discovered by a night watchman.

Peckville—The Mount Jessup Coal Co. has brought suit in equity against the Winton Coal Co. for an injunction restraining the latter from carrying out an alleged forfeiture of mining rights. In the bill the Mount Jessup company states that during the past ten years it has paid to the Winton concern, lessors of the tract, $393,961.88.

Coleraine—While mining conditions at present are slack, anthracite operators are preparing for a return of brisk times in the market. The Beaver slope of the E. S. Van Wickle Estate Co., abandoned 25 years ago, and filled with water ever since, is being pumped out. The coal remaining will be removed.

Plains—Alleging that the defendant company mined, removed and sold over 125,000 tons of coal of small sizes and failed to account therefor, heirs of the estate of J. Robinson Williams have brought suit in equity against the Lehigh Valley Coal Co., in which they ask the court to decree an accounting for all moneys withheld. The suit is based on a coal lease made in 1872.

Shamokin—Sparks from a motor-driven generator set fire to the engine house of No. 6 slope, Hickory Ridge Colliery, operated by the Susquehanna Collieries Co., on Apr. 1, completely destroying the building and ruining the big motors used in hoisting coal from the mine. Several hundred men and boys have been thrown out of employment.

Raven Run—Under the direction of several state mine inspectors and mine officials, every effort is being made to get control of the fire raging in the Girard Mammoth Coal Co.'s mine. Concrete barriers have been constructed, sealing that portion of the mine on fire and cutting off the air currents. By this method officials hope to confine the blaze to the slope workings in which it started. For some time, a culm bank has been burning near the mine, and all efforts to extinguish it have been of no avail. It is thought that when the wind was blowing with the force of a gale on Mar. 27, the fire was carried down an old slope into the mine, where workmen discovered that the coal had ignited.

Pottsville—The Philadelphia & Reading Coal & Iron Co. is planning to apply to the United States Supreme Court to appeal from the decision of the local referee awarding the sum of $5800 to Mrs. John Hancock as compensation for the death of her husband, which occurred near Locust Gap. Mr. Hancock was employed upon a trip between the Locust Gap colliery and

the road at Locust Summit, over which the coal from the colliery is shipped to Shamokin scales. It is held by the company that Mr. Hancock was engaged in interstate commerce in his employment, and it is contended by the attorneys for Mrs. Hancock that the coal was not in interstate commerce until reclassified at the Shamokin yard. It is noted that thus far every court, including the State Supreme Court and the State Compensation Board, has decided in favor of Mrs. Hancock as regards this very fine legal point.

Bituminous

Brownsville—The H. C. Frick Coke Co. has closed down its Fairchance coal and coke plant, located near here, indefinitely.

Brinkerton—The H. C. Frick Coke Co.'s stables at the Mutual No. 4 mine at this place were entirely destroyed by fire the night of Mar. 30, causing a loss estimated at $15,000, partially covered by insurance. Thirty-two horses perished in the blaze, only two animals being rescued. The fire is believed to have been of incendiary origin.

WEST VIRGINIA

Charleston—The Gallatin Mining Co., which has been operating on Wet Branch of Cabin Creek in the Kanawha County field under a lease from J. C. Blair, has subleased the plant to the Wet Branch Mining Company.

Welch—Development work will be undertaken in the near future or as soon as circumstances seem favorable, by the Pulaski Iron Co. on holdings of the company near this place. Percival Johnson, of Pulaski, Va., is the general manager of the company.

Huntington—The Logan Fuel Co., recently chartered, expects to confine its activities for the present to the sale of coal produced in the Thacker, Logan, Kanawha, Pocahontas and New River fields. A. H. Land has been elected president of the company. Others interested are L. B. Ramsey and C. H. Land, the latter of the First National Bank of Logan.

Fairmont—Affairs of the defunct Dakota Coal Co. were wound up when the trustees in bankruptcy of that company presented their report to the former stockholders of the company and paid over $5000 to the stockholders, the bankrupt company thus being able to meet more than all its outstanding indebtedness. This, however, became possible through the purchase of the plant and assets of the company some time ago by the Jamison Coal and Coke Company.

Fayetteville—Work has been started on the plant of the Simrall Coal Co., chartered a month or so ago, a force now being engaged in grading for a sidetrack to the company property in the Winding Gulf field in Raleigh County, where the company has two seams awaiting development—the Beckley and the Pocahontas—surveys of the property having been completed. A number of miners' dwellings will be erected between now and the first of the year, when the company expects to begin operations. Dr. Gory Hogg is president of the company; P. M. Snyder, vice president, and F. D. Drumheller, secretary-treasurer. Among others interested is S. A. Scott of the New River Company.

Morrisville—The Rich Block Coal Co. has changed hands, Charles H. Bronson, J. L. Broh and others of Huntington having acquired the property and assets of the company, the plant being located near here. The officers are: Charles H. Bronson, president; I. J. Rhodes, of McDowell County, vice president; H. L. Broh, of Huntington, secretary-treasurer. The Rich Block Co. originally represented the investment of Roanoke men, having been placed in operation about two years ago. The plant was shut down on Jan. 1 and since that time has not been in operation. Just as soon as a number of improvements contemplated are finished the company hopes to be able to start operations again and on a larger scale than has heretofore been the case.

KENTUCKY

Hellier—The Allegheny Coal and Coke Co. is understood to have completed plans for the construction of the proposed new coal tipple at its plant.

Lynch—The United States Coal and Coke Co. at this place is increasing its development in order to ship 300 cars of coal daily to Gary, Ind., for the United States Steel Corporation.

Hazard—A slate slide in the mine of the Midland Mining Co., on Lotta Creek, resulted in the death of two miners, who were working on the face of a seam. Two other men in the same room were uninjured.

ILLINOIS

Auburn—An explosion in which two miners were killed, occurred early Saturday morning, Mar. 29, at the Panther Creek mine at this place.

Taylorville—Mine No. 8 of the Peabody Coal Co., located here, has been closed for two weeks during which time the machinery will be completely overhauled. About 500 men are temporarily thrown out of employment.

Maryville—The water train on the Troy & Eastern R.R., which supplied the Donk Bros. mine here, has been taken off because the mining company has laid a pipe line to a spring half a mile away which gives promise of supplying all the water that is needed.

Matherville—The mine of the McCraney Sand and Gravel Co., of Rock Island, Ill., has closed down, all the coal having been worked out. It is probable that the tipple will be taken down and moved away. About 25 men were employed in the mine when it closed.

Duquoin—Work has been started on the reopening of the old Barwell mine, which is located on the Wabash, Chester & Western R.R., west of here. Operations are being pushed by a new concern known as F. Soper & Co., of Cutler. The mine was abandoned some time ago, and it will be a long while before the mine is in working condition.

Belleville—State Mine Inspector Wright has filed suit in the court of Justice Wangelin against the St. Louis & O'Fallon Coal and Mining Co., alleging that it has violated the state mining law by failing to provide an adequate washhouse at the so-called Nigger Hollow Mine No. 2, and failing to provide water under proper conditions. The mine employs between 500 and 600 men.

Carlinville—For the second time in a month the record for coal hoisted in a day was broken Saturday, Mar. 29, at the Standard Oil Co. mine here. The day's hoist was 1212 loads, or 968 tons. The mine is being operated every day. Coal is also being produced at the Standard mine at Berry, and the finishing touches are being given to the installation of machinery. Coal is being taken from both the main shaft and the air shaft of the big mine at Shafer, which, when all the machinery is installed, will be the largest producer in the world.

Valier—The village of Valier, east of Duquoin, is rapidly developing into a thriving mining town as a result of the construction of what will be one of the largest mines in the state when completed. The mine, which is on the Burlington R.R., and is owned by that company, was started about a year ago. At the present time several hundred tons of coal are being hoisted each day from the air shaft, while a new steel tipple is being erected at the main shaft. New houses have been built in the town, and at the mine one engine-house, supply-house, washhouse and office building have been finished. A hospital will be erected at the mine in the near future.

TEXAS

Rockdale—The Federal Fuel Co. is understood to be arranging plans for the early commencement of work on the development of a total of about 1400 acres of lignite coal properties in the vicinity of Rockdale, the works to have a capacity of about 1000 tons daily. Headquarters of the company are in the Scanlon Building, Houston. Henry G. Butler is vice president and general manager.

COLORADO

Trinidad—An explosion in the Empire mine of the Empire Coal Co., near Aguilar, on Mar. 31, caused the death of eleven men. At this writing rescue crews are searching for two additional bodies believed buried. Six bodies have been brought to the surface and the bodies of five other dead have been located. Of 36 men who were in the mine when the explosion occurred, 23 made their way out through a connecting shaft.

OREGON

Marshfield—The Southern Pacific Company, which has recently purchased the Beaver Hill coal mine, plans developments to increase the coal output.

Foreign News

Merritt, B. C.—Work has been resumed at the Diamond Vale coal mine.

Personals

George Ing, engineer of the Black Diamond Coal Co., Marion, Ill., has resigned to accept a similar position with the Bell Coal Co. at Zeigler, Illinois.

R. E. McLain, until Jan. 15 superintendent of the Hewittville mine at Stonington, Ill., has been appointed superintendent of the Peabody mine at Stonington, succeeding Superintendent Anderson, who goes to Kentucky.

Lieutenant-Commander H. J. Elson, U. S. Naval Reserve, has been released to inactive status and has resumed his civilian work as secretary and treasurer of the Walter A. Zelnicker Supply Co., of St. Louis, Mo., with which company he was in charge of internal management and manufacturing operations.

E. C. Cherrington and **T. R. Cooley,** who for the past few years have been in the sales service department of the Cutler-Hammer Manufacturing Co. at Milwaukee, have been transferred to the Pittsburgh office of the central district, Mr. Cherrington becoming office manager and Mr. Cooley, engineering correspondent.

Lieut. A. Koenig, of the coast artillery, has been discharged from the service and has joined the forces of the Advance Machinery and Supply Co., Denver, Colo., as sales engineer. Lieutenant Koenig graduated from the Electrical Engineering Department of the University of Colorado in 1913 and has spent about four years in the employ of the General Electric Co., Schenectady, N. Y. The last two years of this time was spent in the Experimental Department.

Charles L. Smith, who has become associated with the newly formed St. George Coal Co., 149 Broadway, New York City,

CHARLES L. SMITH

was connected with Whitney & Kemmerer for 12 years. Mr. Smith came to New York from Pittsburgh in 1899 and became associated with J. Samuel Smoot, now a vice president of Burns Brothers. He remained with Mr. Smoot until 1907, serving as Deputy Commissioner of the Coal Merchants' Association of New York the last three years of that time, Mr. Smoot at that time being the Commissioner. During his connection with Whitney & Kemmerer Mr. Smith was city salesman for that concern and has been largely interested in the trade of large steam consumers. In addition to his other duties, Mr. Smith has for 15 years been the eastern representative of the *Retail Coalman* of Chicago.

Obituary

E. B. Sturgis, president of the Pinehill Coal Co., with offices at 17 Battery Place, New York City, died Tuesday, Apr. 8, at his home in Scranton, Penn. He was in his 74th year and had been in the coal business for upward of 50 years.

William Clayton, a pioneer coal operator of Illinois, died a few days ago at the home of his son, Thomas Clayton, near Collinsville, Ill. He was 80 years old. Thirty-five years ago he sank the first mine shaft in the vicinity of Collinsville. This was followed by another. Both mines were sold to the Consolidated Coal Co., of St. Louis. He was born in England, but came to America in 1863. Until the war prevented he made an annual trip to England. His last voyage was made on the "Lusi-

tania" a few months before it was sunk. Since he retired from mining he has lived on a farm.

Coming Meetings

Illinois Mining Institute will hold its annual meeting May 22, 23 and 24. Secretary, Martin Bolt, Springfield, Ill.

National Coal Association will meet May 21, 22 and 23, at Congress Hotel, Chicago, Ill. Secretary, J. D. A. Morrow, Washington, D. C.

International Railway Fuel Association will hold its annual meeting May 19-22 at the Hotel Sherman, Chicago, Ill. Secretary, J. G. Crawford, Chicago, Ill.

Indiana Retail Coal Merchants' Association will hold its annual spring meeting Apr. 23 and 24 at Indianapolis, Ind. Secretary, R. R. Yeagley, Indianapolis, Ind.

National Foreign Trade Council will hold its sixth convention at the Congress Hotel, Chicago, Ill., April 24-26. Secretary, O. K. Davis, 1 Hanover Square, New York City.

American Society of Civil Engineers will hold its forty-ninth annual convention in St. Paul and Minneapolis, Minn., June 17 to 20. Secretary, C. W. Hunt, 33 West 39th St., New York City.

Mine Inspectors' Institute of the United States of America will hold its annual meeting July 8 to 11 at Indianapolis, Ind., subject to ratification of executive committee. Secretary, J. W. Paul, Pittsburgh, Penn.

American Manufacturers' Export Association will tender a luncheon at 12:30 p.m., to all its members who may be in attendance at the National Foreign Trade Convention in Chicago, Apr. 25 to 26, at the Congress Hotel.

Kentucky Mining Institute after having skipped two years, one on account of the war and the other due to the influenza epidemic, expects to hold its annual meeting this year. While the date and place of meeting have not definitely been set, it will probably be held on May 30 and 31 at Lexington, Ky. Secretary, C. W. Strickland, Huntington, W. Va.

Recent Coal and Coke Patents

Furnace. C. D. Mosher, New York, N. Y., 1,289,037. Dec. 24, 1918. Filed Aug. 9, 1917. Serial No. 185,227.

Ash Sifter. H. C. Miller, Parkesburg, Penn., 1,288,958. Dec. 24, 1918. Filed June 2, 1917. Serial No. 172,514.

Mine Car Wheel and Axle. T. A. Parker, Brazil, Ind., 1,289,249. Dec. 31, 1918. Filed Apr. 30, 1918. Serial No. 231,638.

Smoke Washer. R. J. Johnson, Lake Benton, Mich., 1,289,797. Dec. 31, 1918. Filed Mar. 1, 1918. Serial No. 219,929.

Smoke Washer. S. W. Glassford, Sr., Cleveland, Ohio, 1,289,439. Dec. 31, 1918. Filed June 8, 1916. Serial No. 218,843.

Manufacture of Coke. A. McD. Duckham, Ashstead, England, 1,289,045. Dec. 24, 1918. Filed May 19, 1915. Serial No. 29,145.

Attaching Device for Miners' Cap Lamps. J. M. Brock, Brooklyn, N. Y., 1,289,631. Dec. 31, 1918. Filed June 19, 1918. Serial No. 240,870.

Automatic Coaling Station. M. Miller and T. S. Leake, Chicago, Ill., 1,288,959. Dec. 24, 1918. Filed Apr. 27, 1914. Serial No. 834,796.

Coke Oven. R. S. Moss, Chicago, Ill., and A. Roberts, Evanston, Ill., 1,289,870. Dec. 31, 1918. Filed Jan. 7, 1914. Serial No. 810,809.

Mining Machine. N. O. Levin, assignor to Jeffrey Manufacturing Co., Columbus, Ohio, 1,290,022. Dec. 31, 1918. Filed Aug. 7, 1913. Serial No. 783,564.

Furnace Cleaning Door. C. E. Robinson, assignor to E. Keeler Co., Williamsport, Penn., 1,289,917. Dec. 31, 1918. Filed Feb. 28, 1918. Serial No. 219,574.

Pulverized Fuel Burner. H. S. Flanegin, assignor to Eastern Steel Co., Pottsville, Penn., 1,289,144. Dec. 31, 1918. Filed May 15, 1916. Serial No. 97,666.

Mining and Loading Machine. N. O. Levin, assignor to Jeffrey Manufacturing Co., Columbus, Ohio, 1,290,020. Dec. 31, 1918. Filed Aug. 7, 1913. Serial No. 783,564.

Coal Loading Shovel. W. Ferris, W. M. Bager and M. L. Fykse, assignors to Bucyrus Co., S. Milwaukee, Wis. 1,289,426. Dec. 31, 1918. Filed Apr. 28, 1917. Serial No. 165,215.

Trade Catalogs

Sullivan Drill Sharpener.—Sullivan Machinery Co., Chicago, Ill. Bulletin 72-C. Pp. 24, 6x9 in., illustrated. A compressed air machine for making rock drill and hammer drill bits by hammering.

Flory Hoists. S. Flory Manufacturing Co., Bangor, Penn. Catalog No. 26. Pp. 160, 6 x 9¼ in., illustrated. Eighth edition of the company's catalog of improved hoisting engines and other machinery.

Deister-Overstrom Diagonal Deck Concentrating Tables. Deister Concentrator Co., Fort Wayne, Ind. Bulletin No. 3. Pp. 24, 9 x 6 in., illustrated. Descriptive of the company's diagonal deck types of ore concentrators.

"Imperial" Tie Tamping Outfits. Ingersoll-Rand Co., New York, N. Y. Form No. 9123. Pp. 24, 6 x 9 in., illustrated. Profusely illustrated catalog showing application of outfit on many railroads in the United States.

C-H Wiring Devices—Push Button Specialties. The Cutler-Hammer Manufacturing Co., Milwaukee, Wis., Catalog. Pp. 64, 8 x 10½ in., illustrated. Lists describe and give prices of a full line of push-button sockets.

Plymouth Gasoline Locomotives. J. D. Fate Co., Plymouth, Ohio. Catalog No. 4. Bulletin O. Pp. 8, 8½ x 11 in., illustrated. Gives views of these motors in use at the coal mines and quotes from the testimonials of a number of large operators.

Wheeler Steam Jet Air Pump. Wheeler Condenser and Engineering Co., Carteret, N. J. Premliminary Bulletin No. 113. Pp. 8, 8 x 10½ in.; illustrated. Explains the operating principles of the pump and gives reasons for high efficiency. The inter-condenser is minutely described. The pump is applicable to jet condensers as well as to surface condensers.

Industrial News

New York, N. Y.—Charles F. Ames & Co., Ltd., 90 West St., have been appointed to act as the New York sales department of the Platt Iron Works, of Dayton, Ohio, manufacturers of pumping and power plant equipment.

Chicago, Ill.—F. V. Sargent has been appointed by the Chicago Pneumatic Tool Co. as district manager of sales in the Boston territory, succeeding F. S. Eggleston. Mr. Sargent's headquarters will be at 182 High St., Boston, Mass.

Charleston, W. Va.—Further development of Elk River territory is indicated by the execution of a lease on 113 acres from E. J. and W. E. Thomas to J. G. Vaughn, and should conditions become propitious further plans will be made for mining coal.

Orange, N. J.—The Edison Storage Battery Co. has a new price list, effective Mar. 1, 1919, reducing the price of type A, B and G Edison cells approximately 16 per cent. This company is also boosting prosperity by using the slogan: Procrastination murders industry—stir things up!

Wilmington, Del.—E. I. Du Pont de Nemours announces that effective Apr. 1, T. E. Doremus has been transferred to the E. I. Du Pont de Nemours Export Co. as general eastern manager, with headquarters in Shanghai, China. E. R. Galvin has been appointed manager of the sporting powder division to succeed Mr. Doremus.

Petros, Tenn.—The State Board of Control has recently awarded contracts for the furnishing of the necessary washing machinery, conveying and elevating equipment, belting, etc., to be used in connection with the construction of the new coal tipple at its Brushy Mountain mines, to replace the structure recently destroyed by fire.

Chicago, Ill.—The Chicago Pneumatic Tool Co. announces the discontinuance of its office at Wichita, Kan., and the transfer of stock to Eldorado, Kan., where an office and warehouse have been established. The company also announces the opening of a new office at Tulsa, Okla., 313 Richards Building, with warehouses at 102 No. Cheyenne Street.

Louisville, Ky.—Western Kentucky coal operators have petitioned the Louisville District Freight Traffic Committee for establishment of a rate of $1.35 from the section to Camp Taylor, at Louisville, as against a present rate of $1.40 to $1.60 per ton, and further requests that the rate of $1 per ton from southern Indiana be raised to $1.35, alleging that discrimination is now practiced.

Buffalo, N. Y.—Work on the byproduct plant of the Donner-Union Coke Co., which was suspended when the armistice was signed, has been resumed, the Government taking part. A large force is employed, but the work will take several months. The plan is for the Bonner and Union furnaces in the city to use the coke in their furnaces here. It is reported that the coke ovens of the Lackawanna Steel Co. will also be rebuilt.

Morgantown, W. Va.—The Department of Mining, West Virginia University, has issued a poster descriptive of its short course in coal mining, which begins June 16 and ends July 26, 1919. At the close of the course the State Mining Department will conduct an examination for mine foreman and fireboss certificates. The poster is quite r plete with information. It contains the list of subjects to be taught during the course and gives the schedule of classes.

St. Louis, Mo.—The Standard Rail and Steel Co. announces that I. H. Cohn, formerly of the National Steel Rail Co., has become associated with the company and will be in complete charge of the rail department, handling all matters relative to relaying rails and railroad equipment. The modern plant of the company in Madison, Ill., is now nearing completion. On and after Mar. 31, 1919, the company will occupy Suite 1108-1115, Boatmen's Bank Building, St. Louis.

Charleston, W. Va.—The Lewiston Black Coal Co. will hereafter conduct operations on a more extensive scale at Seth, Boone County, where the plant of the company is located, this operation being on Coal River. The capital of the company has been increased to $100,000. It is proposed to install an electric power plant and electrical machinery throughout, giving the plant a capacity of about 140,000 tons a day. Coal will be mined in the Cedar Grove seam, which at this company's mine is about 5 ft. thick.

Cumberland, Md.—The statistics of the Cumberland coal trade for the year 1918, recently compiled from official sources by the auditor's office of the Cumberland & Pennsylvania Ry., Cumberland, shows a total production of 7,122,441 tons for the Georges Creek and Upper Potomac region in West Virginia. Of this amount 3,205,500 tons were from the Maryland or Georges Creek field and the remaining 3,916,551 tons from the Upper Potomac field. The total output of the two fields has been exceeded in only three previous years—1906, 7,188,033 tons; 1907, 7,360,336 tons; 1910, 7,148,968 tons.

Morgantown, W. Va.—Weather conditions permitting, there will be no further delay in the completion of the Indian Creek & Northern R.R., a coal-carrying road which is being built into the Empire tract in Monongalia County in order to permit the New England Fuel and Transportation Co. to open mines and develop its large holdings in the county. It will require five months to complete construction work started last year, but which was suspended during the winter months. The coal company is going ahead with its work of making openings and getting ready for operations on a very large scale.

Jefferson City, Mo.—The lower House passed the Washhouse Bill on the fourth instant. This bill, which requires all mining companies in the State of Missouri to provide hot and cold water showers for their employees, is one that prevails in nearly all the mining states, with the exception of Missouri. The bill will work a hardship on many of the mining companies, for all companies that have more than five employees come under the law. There are a lot of little strip mines and little drift mines that will evidently have to close down because they cannot stand the expense. A large number of these mines are what is known as "local mines," which provide coal for the little communities close by in the winter months.

St. Louis, Mo.—The Interstate Commerce Commission, in a brief forwarded by Joseph W. Folk, general counsel of the St. Louis Chamber of Commerce, is asked to throw out in its entirety the report recently filed by Examiner Mackley, which held that the bridge arbitrary of 20c. a ton on coal transported from East St. Louis to St. Louis is justified. The examiner's report, he declares, is based on erroneous assumptions and erroneous conceptions of law. He asks that the Commission require the railroads to make and maintain a basis of group rates from the Illinois mines to St. Louis, East St. Louis, Dupo, Venice, Madison and Granite City, composing the St. Louis industrial district. In his brief Folk takes 25 exceptions to the findings of the examiner. The arbitrary has been in dispute for several years, and has been in litigation and before the Interstate Commerce Commission much of the time.

MARKET DEPARTMENT

EDITED BY ALEX MOSS

Weekly Review

Railroad Fuel Controversy Still at Its Height—Buying of Bituminous Still of a Desultory Character—Contract Business Being Closed—Best Grades of Soft Coal in Demand —Anthracite Investigation Discloses That Price Increase Was Justified

OF CHIEF interest in the coal situation during the past week was the turn of events in the railroad fuel controversy. The Railroad Administration has come out flat-footed against a price-fixing program. Until this vexatious question is settled the general market cannot be said to be on a firm basis.

The efforts of the Industrial Board of the Department of Commerce to promote business activity by stabilizing prices have, by the attitude of the railroads, been brought to naught. The steel men, who had taken it for granted that the Railroad Administration would purchase rails after they had reduced prices from 10 to 14 per cent., are now disillusioned. The coal men, when approached by the Industrial Board with a similar proposition to fix coal prices, profiting by the developments in the steel situation, demanded assurances that the Railroad Administration and other Government departments would buy coal at the prices agreed upon. Chairman Peek, of the Industrial Board, upon taking the matter up with Director General Hines was informed that the railroads insisted upon purchasing coal in their own way and at their own price.

Stripped of all camouflage, this means that the railroads insist that coal be sold to them below the cost of production, and that the public be made to pay more than a just price for the coal it consumes. In other words, the Railroad Administration asks the bituminous coal operators to gouge the public in order that the railroads may purchase their coal supplies at a ridiculous price.

In the meantime the attitude of the Railroad Administration is working the bituminous coal industry a great deal of harm. Large consumers are buying only from hand to mouth, as it were, hoping that the railroads will prove successful in their attempt at beating down prices, and expecting to make the lower prices the basis for much of the now-delayed contract business for the coming coal year. The result is that there is much idle time at the mines. Operators, however, have learned some lessons during the recent war period. They purpose adhering to their policy of selling coal at a reasonable profit—and in this they have the backing of their employees.

Market conditions in bituminous coal show signs of improvement in spite of the many deterring influences, though buying is still on a relatively small scale. The best grades of coal are most in demand, consumers as a rule exercising the keenest sort of discrimination in the selection of fuel to meet their needs. In some cases concessions have been made on coals of medium to inferior grades. Many industries, however, have not yet resumed anywhere near normal activity and will not buy and store coal regardless of price.

Some contracts have been closed for the new coal year by purchasing agents who have carefully surveyed the situation. Labor troubles are impending, a car shortage is almost certain when crops begin to move in the summer and fall, and production of soft coal is lower than ever. In fact, the daily output of bituminous for the week ended Mar. 22 is the lowest recorded during the past three years, the total tonnage mined for the week in the entire United States being 7,599,000 net tons. Consumers who are not covered by contract will find themselves unable to procure all the spot coal they need as the months go by.

Of the utmost importance to the anthracite industry was the statement made by Governor Sproul of Pennsylvania on Apr. 4 that the increase of 10 cents a ton in the price of hard coal beginning with May is justified. It will tend to stimulate buying on the part of consumers who were of the belief that investigation would lead to a charge of profiteering on the part of the operators.

Owing to the lack of demand, the production of anthracite has been decreasing steadily, though the output of 1,437,000 net tons during the week ended Mar. 22 is 216,000 net tons better than the output the week previous. Production at the mines should be stimulated as much as possible during the coming spring and summer months, or else hard coal will be scarce and prices much higher in the fall and winter. Consumers should heed the "Order Early" injunction of Dr. Garfield and lay in their coal supply now.

WEEKLY COAL PRODUCTION

The output of bituminous coal in the United States during the week ended Mar. 29 is estimated at 7,599,000 net tons, as against 7,488,000 net tons during the week ended Mar. 22, and 11,006,000 net tons during the week ended Mar. 30, 1918. The increase during the current week of slightly over 100,000 net tons was slight, and by no means records the improvement which was expected as a result of the "Order Early" campaign inaugurated by the United States Fuel Administration several weeks ago. In fact, the present daily output is the lowest recorded during the past three years. Estimates place production for the coal year ended Mar. 31 at 558,000,000 net tons, which production was approximately 6,300,000 net tons in excess of the output of the coal year 1917-18, or slightly over 1 per cent. During the current week the average production per working day is estimated at 1,266,000 net tons in comparison with 1,784,000 net tons for the coal year 1918-19, and 1,763,000 net tons for the year preceding.

The production of anthracite in the United States during the week ended Mar. 29 is estimated at 1,437,000 net tons, and is a considerable improvement over the output during the week ended Mar. 22, estimated at 1,221,000 net tons. The output of the corresponding week of 1918 was estimated at 2,099,000 net tons. The total production for the coal year to date is estimated at 91,975,000 net tons, as against 99,568,000 net tons during the same period of last year. The daily average per working day during the current week is estimated at 240,000 net tons, and is considerably in excess of the daily average recorded during the past few months.

Carriers' reports for the week ended Mar. 29 show increased loading in all districts with the exception of the southern West Virginia fields, southwestern Virginia and the Iowa, Texas and southwest states. The decreases where they occurred were slight, while in central Pennsylvania there was an increase in loading of 1100 carloads, or approximately 5 per cent., and in Ohio 1200 carloads, or 10 per cent. Slight increases occurred in all other fields.

Bituminous coal shipped to New England by tidewater during the week ended Mar. 29 is estimated at 89,166 net tons, and is a slight decrease compared with the tonnage shipped during the week ended Mar. 22, estimated at 93,376 net tons. Shipments to New York and Philadelphia during the current week were extremely light, amounting to but 14,235 net tons as against 40,432 net tons during the week preceding. Shipments from Baltimore were slightly in excess of those of the week ended Mar. 22, while the tonnage loaded at Hampton Roads exceeded that of the preceding week by 4 per cent.

Total shipments of bituminous coal from all tidewater harbors, during the week ended Mar. 29, are estimated at 402,126 net tons, and exceed the tonnage shipped during the preceding week by approximately 11 per cent. The improvement occurred at all harbors with the exception of Baltimore, where the tonnage loaded amounted to 25,538 net tons, as compared with 32,040 net tons during the week ended Mar. 22.

The production of beehive coke in the United States during the week ended Mar. 29 was extremely low, and the estimate of 365,107 net tons for that week is 39,168 net tons, or approximately 10 per cent., below the production of the week ended Mar. 22, and 244,056 net tons or approximately 40 per cent. below the production of the corresponding week of 1918. For the calendar year to date, the production is estimated at 5,979,152 net tons, as against 7,102,192 net tons during the same period of last year, all states falling behind the output recorded during 1918. The daily average per working day during the current week is estimated at 60,851 net tons, as compared with 78,673 net tons, the daily average for this year to date, and 93,000 net tons, the daily average for the same period of 1918.

BUSINESS OPINIONS

Marshall Field & Co.—Current wholesale distribution of dry goods is running much less, compared with the same week of 1918. Orders from road salesmen for immediate delivery were in smaller volume and commitments for fall were much below the total of the comparative period of last year. Trading is very active but in small lots, and many more merchants were in the market. They report a continuance of excellent retail business. Collections were satisfactory.

Bradstreet's—More irregularity is shown in the general trade and industrial situation with a rather sharply defined difference in the tone of reports from purely distributive trade as opposed to those dealing with big primary lines such as iron, steel, coal and kindred trades. In the former, despite weather irregularities such as rain and snowstorms actual buying of spring goods, men's wearing apparel, clothing, shoes, women's wear in general, millinery, implements and hardware has expanded at many points.

The Iron Age—The second week of the new iron and steel prices has brought little broadening of demand. Inquiries and specifications have increased, but practically all the business offered is still recognized as having been held back awaiting the reductions. The Railroad Administration's refusal to accept the Industrial Board's prices on steel or to be bound by those yet to be fixed on coal and building material seriously threatens the whole stabilizing program, since the railroads would buy normally over 25 per cent. of the country's production of coal and 20 per cent. of its steel. It is not surprising in view of the jumble at Washington, that individual buyers are in no haste to spread sail.

American Wool and Cotton Reporter—The Boston wool market is fairly active and there is still a good demand for fine wools of all kinds. Although it is a bit early for many transactions in the new domestic clip, growers and country dealers are showing a keen interest in prospects. Heavy buying of domestic fleeces is looked for, and some are predicting that the season will open with prices around 40 to 45c. to the growers. Shearing is under way in Arizona, and the cutting of the new clip in eastern Utah and northwestern Colorado started this week. Cotton mill treasurers feel optimistic and several authorities in Boston predict that the mills will soon be in the market for more of the staple. The United States seems to have a splendid future ahead of it in cotton and in other commodities.

Atlantic Seaboard

BOSTON

Somewhat better inquiry. Concessions made for prompt shipment all-rail. Large buyers still withhold purchases. No developments in railroad buying. Differential heavily against distribution inland from tidewater plants. Hampton Roads coals confined to seaboard. No active market looked for until July. Shipping situation not helpful. Railroad-owned barge rates announced. Will help movement over New York piers. Much talk of fuel oil. Reduced rates named on anthracite barges. Fair volume of business for April mining, but demand lacks snap. Light receipts everywhere in March. Retailers advise householders to take on coal. Screenings and steam sizes not so plentiful.

Bituminous—The past week there have been signs of improvement, but buying is still on a relatively small scale. Inquiry for the higher grades all-rail is more noticeable; there is more discrimination than was usual in normal years, and instances multiply where consumers are taking pains to select coals that will meet their individual requirements. This is particularly true among those who have ordinarily used Pocahontas and New River from Hampton Roads. The few coals in central Pennsylvania that have coking qualities are being specially sought by consumers of this kind. A considerable tonnage has been placed in this territory at $3.10 per net ton f.o.b. mines through selling agents who are in position to assure their trade that coal of Navy standard will be furnished.

At the same time, on practically all but the quality grades, there are considerable concessions made to induce consignees to take coal in April and May. Grades that are held with reasonable firmness for contract at $2.95 are being offered for spot shipment at $2.65@2.80, and with little result. In the Fairmont district every effort is being made to get orders for the next 60 days, but the outlook is discouraging so far as New England is concerned. In the Greensburg and Pittsburgh districts there is the same light output and the same pressure on consumers to supply shipping instructions. A few comprehensive orders will soon be in the market, and there will be a great deal of interest in the trade to see whether contracts are closed for season delivery or whether it is decided to buy from month to month as the railroads have begun to do.

Buyers now completely understand the heavy differential that applies against rail-and-water deliveries to inland points. There are industrial centers like Fitchburg, Mass., where reliance was ordinarily placed on water coal via Providence and Boston, but where there is now a freight rate inland from Boston of $1.40 besides a largely increased charge at the rehandling point. It is a foregone conclusion that Hampton Roads coals will have no chance whatever this year to meet all-rail competition at such a point, or even at Lawrence, Mass., where the rate from Boston is $1.05. Current prices at Boston are $7.50@7.75 on cars, while to most points the all-rail rates are $3.20@4 from central Pennsylvania. It is easy to see therefore that Hampton Roads coals this year will be pretty generally confined in this territory to a fringe along the seaboard. At present minimum freights from Norfolk or Newport News the quality of Pocahontas and New River will doubtless hold such tonnage, but the loss inland is going to be very large. The smokeless agencies are making efforts to place their coal on the $5.14 per gross ton basis at Hampton Roads, but even at $2 freight to Boston the proposition is not favorable enough to induce much buying. A share of what business was to be had was closed on the basis of $2.35 per net ton f.o.b. mines for Pocahontas.

No active market on Southern coals, at least, is expected before July, although the quiet purchases now being made from time to time tend, of course, to discount any really active market the coming season. Factors who own their own steamers are certain of their seaboard trade, to an extent, but those who are not so situated will doubtless find very light picking. Certainly that is the state of things today, and the attitude of the Shipping Board in not making a further reduction of rates on steamers belonging to the Government is not calculated to help.

A feature of the marine freight market is the recent reduction of rates on bituminous in railroad-owned barges. From Port Reading, N. J., to Boston the rate has been reduced from $2.05 to $1.30, the rate to points east of Newburyport being fixed at $2. This reduction is not expected to have any marked effect upon the situation, the reduction to points east of Newburyport amounting to only 40c. It will not, however, dispose the railroads in Maine to turn any more readily to steamers from Baltimore or Hampton Roads.

Bituminous prices at wholesale are about as follows, f.o.b. mines and at loading ports, per gross or net ton as designated:

	Clearfields	Cambrias and Somersets
F.o.b. mines, net tons	$2.15@2.75	$2.80@3.35
Philadelphia, gross tons	4.20@4.90	5.00@5.40
New York, gross tons	4.50@5.25	5.35@5.80
Alongside Boston (water coal), gross tons	6.10@6.85	6.90@7.65

Georges Creek is quoted at $3.20 f.o.b. mines per net ton.

Pocahontas and New River are unchanged at $4.69@5.14 f.o.b. Norfolk and Newport News, Va., for spot coal. Alongside Boston the present gross ton range would be $7.15@8.10.

Anthracite—The important announcement this week was the revision downward of rates on hard coal in barges under the jurisdiction of the Railroad Administration. Just at a time when the trade was beginning to despair of an equitable decision the new freights were given out. The $1.80 rate to Boston was reduced to $1.25, and to other points in proportion. The rate of $1.75 to Long Island Sound ports is scaled down to $1.15, and the rates to ports east of Newburyport from $2.10 to $1.35@1.50. The effect upon many retailers along the coast was almost immediate. They began filing their orders for spring shipment, realizing that the present basis is in all probability the lowest cost price of the year.

Steam sizes, and particularly dock screenings, are in short supply at all the loading piers. There seems to be a liberal inquiry for these coals, but buyers are discriminating and do not make purchases unless they can get the quality desired.

NEW YORK

Retail dealers are receiving all-rail coal in large quantities. With the mines working but little more than half time, stocks of the steam coals are kept down and prices are maintained. Consumers expected to place orders for next winter's supply. Bituminous operators watching controversy with Railroad Administration. Loaded barges scarce and good prices are obtained for them. High grade coals in demand.

Anthracite—The continuation of the marine tie-up in this harbor has resulted in more all-rail coal coming into Manhattan and the Bronx than has been received here in many years. In this way the problem of keeping the inhabitants of these two boroughs from freezing, if such a thing were necessary, has been solved, and its value may be proved in the event of a tie-up or any serious transportation difficulty at some future time. The loaded cars are brought into the city via the Poughkeepsie Bridge route and the New York Central lines and are easily transferred across the Harlem River and canal by railroad lighters. Those dealers whose yards are not located along the tracks can load the coal into trucks and cart it to the consumers.

There has not been much activity in spring buying. While retail dealers have placed orders with the wholesale dealers, the receipt of orders by them has not been up to expectations. A decided improvement is looked for during the next few weeks when consumers are satisfied that there will not be any spring decrease in prices. Dealers are circularizing their trade and advising them to place their orders early.

Retail prices in Manhattan and Brooklyn show a difference of 50c. per ton for the domestic coals, the schedule being as follows:

	Manhattan	Brooklyn
Broken or egg	$10.00	$10.50
Stove	10.25	10.75
Chestnut	10.35	10.75
Pea	8.50	9.00
Buckwheat	6.90	7.00
Rice	6.40	6.50
Barley	5.95	6.00
Soft coal	7.25	7.25

For the first time in a couple of years city departments are advertising for coal and buying it according to specifications. Since shortly after this country entered the war the specifications have been suspended and the buying was done in the open market.

Dumpings of anthracite here for the week ended Apr.4 show an increase of more than 1000 cars over the previous week, 1917 cars having been dumped as compared with 986 the week before. During March 6439 cars were dumped as compared with 15,137 cars in February and 23,756 cars in January.

The steam sizes, because of the slow work at the mines, are not in over-supply and prices are being held firm.

Current quotations, white ash, per gross ton, at the mine and f.o.b. tidewater at the lower ports are as follows:

	Mine	Company Circular
Broken	$5.95	$7.80
Egg	5.85	7.70
Stove	6.10	7.95
Chestnut	6.20	8.05
Pea	4.80	6.55
Buckwheat	3.40	5.15
Rice	2.75	4.50
Barley	2.25	4.00

Bituminous—The local trade has had much to engage its attention this week. Most dealers are watching the developments in the controversy with the Railroad Administration regarding coal purchases and no doubt would like to see it ended. They are also interested in the outcome of the marine strike and daily expect a settlement. Many consumers are almost without coal and are on the anxious seat regarding future supplies.

Loaded barges which were obtainable are now nearly all taken. Following the settlement with the tidewater boatmen last week there was a rush to fill the waiting boats, and many shippers were successful. Some of the barges were on their way to destination when the tugmen were ordered to stop work, and further shipments were stopped. Altogether it was estimated there were 100 barges tied up at the various terminals.

There were dumped at the local docks during the week ended Apr. 4, 3449 cars as compared with 3012 cars the week previous, and during the month of March 11,516 cars as compared with 23,668 cars in February and 23,769 cars in January.

There is a good demand for high-grade

coals, and while the range of prices does not show any change from those of a week back, there were some slight changes in individual sales on certain coals.

Buyers continue to cling to the notion that prices are going downward and hesitate before closing up for a year's supply.

Current quotations at the mine for various grades of bituminous coal for spot delivery and contract follow:

	Spot	Contract
South Forks	$2.90 to $3.25	$2.95 to $3.50
Cambria County (good grades)	2.80 to 3.10	2.95 to 3.25
Clearfield County (good grades)	2.65 to 2.95	2.80 to 2.95
Reynoldsville	2.65 to 2.85	2.85 to 2.95
Quemahoning	2.85 to 3.10	2.95 to 3.10
Somerset County (best grades)	2.75 to 2.95	2.95 to 3.10
Somerset County (poorer grades)	2.40 to 2.75	2.75 to 2.95
Western Maryland	2.50 to 2.75	2.65 to 2.85
Fairmont	2.10 to 2.35	2.35 to 2.50
Latrobe	2.10 to 2.25	2.25 to 2.40
Greensburg	2.35 to 2.40	2.35 to 2.60
Westmoreland ¾-in.	2.60 to 2.75	2.65 to 2.75
Westmoreland run-of-mine	2.40 to 2.65	2.40 to 2.65

BALTIMORE

A little better line of inquiry developing in soft coal and prices on immediate sales somewhat stronger. Contract quotations firm and closings few. Hard coal retail schedule is announced for a month.

Bituminous—The larger factors in the soft-coal trade here all say that there is a better inquiry for fuel. Letters are now coming in asking for quotations both on contract and on immediate sales. On immediate sales there is a tendency to stiffen now that the mine production curtailment has about reached the proportion of the demand for coal for quick delivery.

Few contracts are being made for the time being, the consumers apparently standing by the plan to purchase in the open market. The idea that the Government talk of lower coal prices is to be a real element for the future is being encouraged by consumers and laughed at by the better posted coal men. The latter say that the Government's well known attitude of discouraging any attempt to cut mine wage scales in order to allow production at a price that would enable a cut in coal prices and at the same time assure fair profits to the trade is too assured to make any material cut possible.

Locally one part of the trade, that interested in bunker coal, is not satisfied with the railroad administration rule at this point which is forcing all except coal cargo taking ships to bunker from lighters. They say that the added cost of the lighter plan is sending ships for bunker coal to Newport News, where it is possible to take bunker coal direct from the chutes. This end of the trade is also looking to the early clean-up of some 18,500 tons of navy coal stored here, which was bought by the Shipping Board to be sold to vessels under its control, to the exclusion of just that much private business in the trade.

Anthracite—The hard-coal dealers have announced their retail schedule, which is to remain in force until further notice. The prices are 40c. below those set last Nov. 11 by the Maryland Fuel Administration and which remained in effect until the present new rate was given out the past week. Dealers are now urging consumers to take coal at once, and warning that the wholesale advance of 10c. per month from May 1 will ultimately force up the retail rates. Just how and when the 50c. wholesale advance to Sept. 1 is to be absorbed by the retail trade has not as yet been decided upon. The new retail schedule, based on the long ton of 2240 lb., with 25c. off for cash within ten days of delivery and 50c. a ton added for all bag or wheelbarraw haulage from carts to cellars, is as follows:

	Ton	Half Ton
Hard White Ash—		
No. 1 (broken)	$11.50	$5.90
No. 2 (egg)	11.50	5.90
No. 3 (stove)	11.75	6.00
No. 4 (chestnut)	11.85	6.10
Pea coal	10.00	5.15
Buckwheat	8.20	4.25
Sunbury—		
No. 2 (egg)	11.50	5.90
No. 3 (stove)	11.75	6.00
No. 4 (chestnut)	11.85	6.10
Lykens Valley—		
No. 2 (egg)	12.20	6.25
No. 3 (stove)	12.60	6.45
No. 4 (chestnut)	12.60	6.45

PHILADELPHIA

Anthracite trade improved by cold spell. Dealers clean up old stock. Better April outlook. Retailers discuss credits. Criticism of freight rates. Stove and nut in demand, egg fair, with pea lagging. Buckwheat moving well, rice also. Barley very heavy. Bituminous shows little improvement. Shippers ask fair rail fuel price. Interest in exports.

Anthracite—Due to the unusual change in weather conditions business at present is enjoying quite a spurt. Cold weather as severe as any during the past winter, together with high winds, caused many householders to hurry to their coal man. The demand for immediate deliveries in small lots was too great to be taken care of to the satisfaction of the buyers, and many homes were cold for a day or two. It has been a long while since the dealers were flooded with so many orders for half tons.

Most representative dealers seem inclined to carry capacity stocks, but they point out that the present high prices, together with the heavy freight rates, makes the investment in a big stock too much to carry without considerable cash business. With this end in view several of the larger dealers have been advocating, and some have actually agreed to advance the present prices 25c. a ton, with a discount of the same amount if bills are paid within five days. Another plan was to continue the present prices and offer a discount of 25c. therefrom as an inducement to pay cash.

There is considerable dissatisfaction among the shippers as well as the dealers over the freight rates. The dealers located on the Pennsylvania R. R. tracks are protesting because under the regular tariff they are compelled to pay 10c. per ton higher rate than their competitors on the Reading Ry. Some shippers cannot compete for business on the Reading Ry. because of prohibitive rates. In some cases it amounts to an additional 20c. per ton, and their trade say they cannot afford to pay the difference. In no cases have we learned of the shippers absorbing the excess.

The demand for stove and nut exceeds that for the other sizes, and all shippers have a comfortable supply of orders for them. Egg is quite fair, while pea coal still lags. Several shippers report having changed their screens and to be shipping a larger size pea, but the dealers claim there is still room for improvement. It will probably be some time before this former most popular size recovers from the setback caused by the lowering of the standard of preparation and increase in price.

While the demand for buckwheat is light, yet the production is reported to be well absorbed on account of the former light working time; but with increased operating days it is believed that there will soon be more than enough to go around. Contracting is very slow, and while shipments to the large buyers continue, the signed contracts for some of them have not been returned to their shippers. The price for transient business is being cut by some of the individuals, but not to the extent of several weeks ago. We hear of sales around $3. Rice is in somewhat better demand than buckwheat at this time, but can still be bought for close to $2.25. Barley is away off and most shippers are having trouble with it. Sales are reported as low as $1.50.

The prices per gross ton f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken	$5.95	$7.80	Buckwheat	$3.40	$4.45
Egg	5.85	7.70	Rice	2.75	3.65
Stove	6.10	7.95	Boiler	2.50	3.50
Nut	6.20	8.05	Barley	2.25	3.15
Pea	4.80	6.40			

Bituminous—The trade continues quiet. Whether there is any improvement over the previous period is hard to determine. Some shippers admit conditions to be better, while others are inclined to believe the reverse. Certainly there is little activity. Contracting continues to be uppermost in the minds of most shippers, and with some new business closed occasionally as the manufacturers begin to realize that there is little chance of better figures being offered.

We give below a list of prices prevailing in this market, although it is difficult to compile them with accuracy, for while the table represents prices the operators feel they should have, we believe that they are being shaded in quite a few instances:

Georges Creek Big Vein	$3.00 @ $3.10
South Fork Miller Vein	2.90 @ 3.10
Clearfield (ordinary)	2.65 @ 2.90
Somerset (ordinary)	2.55 @ 2.80
Fairmont lump (ordinary)	2.40 @ 2.50
Fairmont mine-run	2.25 @ 2.35
Fairmont slack	2.10 @ 2.20

Lake Markets

PITTSBURGH

Market but little changed. Steel industry consuming less coal. Lake shipments will largely be deferred.

The controversy regarding prices the railroads will pay for coal has not had any great influence upon the local coal market, for the reason that transactions had been of a hand-to-mouth character. Of more importance to the local market is the fact that the reduced prices for steel, as developed by the Industrial Board and effective in the open market Mar. 21, have not resulted in increased buying. Some orders for steel that would have been placed at the old prices if there had been no prospect of reductions were held back and have since been placed, but no new buyers have appeared.

The investment buyer was not brought out by the steel reductions, and so the Director General of Railroads, in refusing to buy at the Industrial Board prices, is merely keeping company with the public. Steel mill operations have decreased further and the outlook for coal consumption in the steel industry is far from good. The tinplate mills, which consume a particularly large amount of coal per ton of output, are not running as well as it was expected they would be by this time.

Domestic coal trade is poor, the season being practically over. A little lake coal is being moved, but not much, and it seems probable that nearly all the season's movement will occur in the second half of the navigation period.

There is more cutting on steam coal, $2 being frequently accepted. Quotations of a week ago are repeated except for mine-run steam coal: Steam coal—Slack, $2@2.10; mine-run, $2.10@2.35; Gas—Slack, $2.25@2.35; mine-run, $2.35; ¾-in., $2.50@2.60; 1¼-in., $2.60@2.75, per net ton at mine, Pittsburgh district.

BUFFALO

Some report of improvements. Others are calling the situation unfavorable. An increase of bullish reports ought to mean something. Anthracite going afloat fast. Retailing moderately active.

Bituminous—"I am decidedly optimistic," said a Buffalo jobber. He sells about as much coal as anyone and ought to know the market. At the same time there is not much improvement in sight. However, it looks as if the turn in the trade was not far away, so the shippers are hopeful. The despondent coal jobber is not so numerous as he was.

The Canadian market does not improve, for manufacturing there is not so good as it was, and it does not appear to be increasing. Jobbers are still covering that territory as carefully as they can, but the salesman who can sell much coal is a genius. This condition is likely to last some time yet.

Bituminous prices are pretty firm. Some bidding on contracts has been low, but it is asserted by the trade generally that the coal offered was not up to standard. Jobbers quote, as before, $2.65 for thin-vein Allegheny Valley, all sizes; $4.45 for Pittsburgh and No. 8 lump; $4.20 for same, mine-run and slack; $5.65 for smithing and smokeless, and $5.60 to $6.10 for cannel, all per net ton, f.o.b. Buffalo.

Anthracite—The trade is better than usual, considering that many consumers laid in so much coal. We have just passed a week of the steadiest cold weather of the season, the capriciousness of it being shown by the fact that on the night of Mar. 26 we broke the high temperature record—70 deg.—and on the night of Apr. 1, six days later, we broke the low record—11 deg.

The real activity in anthracite is in the loading of lake vessels, about 35 now having received cargoes, totalling a matter of 200,000 tons altogether. The other side of this is that nobody wants the coal, and the vessels are waiting for something to bring back before they sail. In spite of the open water the opening of the season promises to be late.

Local anthracite prices range as follows:

	F.o.b. Cars, Gross Ton	At Curb, Net Ton
Grate	$8.55	$10.35
Egg	8.45	10.20
Stove	8.70	10.10
Chestnut	8.80	10.50
Pea	7.00	9.05
Buckwheat	5.70	7.75

With 25c. additional for loading to lake vessels.

CLEVELAND

Contracting in the first week of the new coal year, which has opened quite briskly, has developed decided weakness in bituminous coal. A good-sized block of No. 8 ¾-in. lump for the head of the lakes has gone at $2.35, a reduction of about 25c. over last season. Offers of No. 8 ¾-in. lump to northern Ohio users have ranged all the way from $2.60 to $2.20. Weakness is in evidence all along the line, and the general appearance is that the market will grow softer before it again grows stronger.

Bituminous—After having held for weeks to their claim that they could not afford to shade former Government maximums, and permitting operations at their mines to drop to 20 and 30 per cent. in substantiation of this claim, operators in the No. 8 district of Ohio have weakened. Any amount of standard No. 8 ¾-in. lump can be contracted for now at as low as $2.20, and an inquiry for a tonnage of alluring size doubtless would shave another 10 or 15c. off this figure.

One big No. 8 operator has opened the new coal year by selling 200,000 tons of No. 8 ¾-in. lump to an upper lake dock interest for $2.35. Not only is this a reduction of 25c. over one year ago, but the commission and handling charges were lowered proportionately. Last week the 1918 lake carrying charge of 48c. a ton was abandoned and the 42½c. rate of 1917 revived.

A fair-sized contract for No. 8 district prepared sizes is reported made at $2.50. The last Government price on this grade was $2.60. Several good-sized sales of No. 8 ¾-in. lump to northern Ohio users at $2.35 also are reported.

Efforts still are being made by operators to persuade steam-coal users to stock now in anticipation of a shortage of both coal and cars Nov. 1 or shortly thereafter. The only ray of hope for the domestic trade is the threat of the natural gas company supplying Cleveland to double its price in order to force domestic consumers to abandon gas in favor of coal for heating purposes next winter.

Lake Trade—Bituminous cargoes are in greater demand for lake shipment than last week, and the trade is picking up a great deal faster than even the most optimistic had hoped for. The first cargo probably will not be unloaded at an upper lake dock much before the first of May. With the 1919 carrying charges fixed—42½c. a ton to the head of the lakes and 50c. to Lake Michigan—and the first authenticated sale of lake coal announced, every obstacle to a free movement in the lake trade has been eliminated.

Prices of coal, per net ton delivered in Cleveland, are:

Anthracite:	
Egg	$10.85 @ 10.95
Chestnut	11.00 @ 11.10
Grate	10.90 @ 11.05
Stove	11.05
Pocahontas:	
Lump	7.50
Mine-run	7.20
Domestic Bituminous:	
West Virginia splint	7.05 @ 7.15
No. 8 Pittsburgh	6.15 @ 6.35
Massillon lump	6.95 @ 7.10
Steam coal:	
No. 6 slack	4.45 @ 4.55
No. 8 slack	4.75 @ 4.90
Youghiogheny	4.95 @ 5.05
No. 6 mine-run	4.45 @ 4.55
No. 8 mine-run	4.85 @ 5.10
No. 8, ¾-in	5.40 @ 5.60

DETROIT

Lack of demand, owing to large reserves on hand, is a feature of the unsatisfactory conditions in the Detroit market for bituminous coal.

Bituminous—With only a small volume of buying, jobbers and wholesalers say the Detroit market could scarcely be more unsatisfactory than they now find it. Orders come irregularly and in a scattering way, and are seldom for quantities greater than one or two cars at a time, suggesting a sort of hand-to-mouth effort on the part of buyers to fill in for current requirements. Retail dealers are taking domestic lump in small consignments, stipulating speedy delivery, with a view to getting the coal to their customers before higher temperatures arrive.

While lump and prepared sizes are usually holding at the fuel administration prices, slack and mine-run find buyers less readily and with only a small amount reaching Detroit; quotations are said to have been made on slack as low as $1.65 at the mines, with similar shading of price on mine run. Jobbers say that Government prices are the basis of quotations on prospective contracts, though little interest is noted in that direction.

Anthracite—With receipts of anthracite only moderate in amount, the market is apparently well supplied. Numerous retailers are urging domestic consumers to stock up now for next winter and are announcing their ability to fill orders for any size to the full extent of the customer's requirements.

COLUMBUS

The oversupply of small sizes is one of the big features of the coal trade in Ohio. Operators are at a loss to dispose of the slack and consequently are curtailing their production of lump. Contracting is still slow.

Operators and shippers are finding it difficult to dispose of their screenings. Because of lack of demand for the small sizes screenings have become a drag on the market and as a result the production of prepared sizes is being reduced. There appears to be no remedy for this situation, and operators see little indication of an increase in demand for slack.

General steam business is still rather slow, as contracting is being held up by the unsettled price situation. Quite a few contracts expired around Apr. 1, but few have been renewed. Because of the large amount of spot coal available, much of it at reduced quotations, consumers are slow in entering into contracts.

Sales agents are now devoting their time to calling on the trade and getting an expression as to when the purchaser will be in the market. Some contracts have been made with the price left blank, to be filled in when settled quotations are developed. Some lake contracts have been made in the same way. But generally speaking, the consumer is playing a waiting game and is not disposed to rush matters.

Domestic business is rather quiet. Retailers are not buying to any extent. Some demand for the fancy grades is reported, and there is quite an inquiry for Pocahontas and West Virginia splints. Retail stocks are fairly large, and consequently dealers are slow to buy. There will be a considerable tonnage carried over by consumers. Retail prices are being cut to a small extent, but the larger yards are still maintaining quotations.

LOUISVILLE

Demand slightly better for steam coal, but large operators figuring on a dull market for 30 to 60 days. Lake movement slow in starting. Prices fairly well maintained.

There has been a slight improvement in the demand for steam coal during the past few days, but domestic is rather draggy, and more effort is being made to sell straight mine-run than any other grade, as it enables the operator to produce coal more profitably, considering the weakening demand for domestic. Some of the small mines not equipped for screening have been offering mine-run at considerably under the market, resulting in close competition.

Prices as a whole are about the same as they have been, although many operators are quoting no domestic for less than $3 in eastern Kentucky, and the Jellico district has set a price of $3.25 for domestic during the months of April, May and June. Some little spot coal is reported to be selling at low prices, but jobbers say that when they go to buy such coal they find that it has been taken up, or that the reports were not correct. However, a few operators on the Louisville & Nashville lines are known to have quoted at low as $1.90 per ton on mine-run direct to large industrial consumers for immediate shipment. Some of this coal is under grade.

A few of the leading operators foresee dull business during the rest of April, and probably well into May, due to the fact that immediate delivery business is not heavy, and neither the operator nor the buyer can get together on contract prices. The mine operator is not anxious to contract at even the so-called Government figures, and the industrial consumer wants an even lower price.

Demand for steam coal is picking up somewhat, due to the fact that some industries are running low, and others are opening up for the spring season. Brick plants are just getting started and report a fair volume of business, considering the generally dull building movement.

Quotations on a short-ton basis for eastern and western Kentucky fields are as follows:

	Eastern Kentucky	Western Kentucky
Block and egg	$2.85@$3.00	$2.60
Run-of-mine	2.25@ 2.40	2.35
Nut and slack	2.00@ 2.10	2.05

Brokers are allowed 15c. per ton on these prices.

BIRMINGHAM

Steam demand continues light. High-grade domestic sizes readily taken, the supply not being equal to requirements of the trade. Some improvement shown in sales of cheaper grades. Production slightly heavier than previous week.

Buying of steam fuel continues to lag and trade conditions have not improved over the previous week. Consumers who have exhausted their stocks are only taking such tonnage as will supply their needs of the immediate future. The Frisco R. R. closed contracts for approximately 20,000 net tons per month with mines on its lines in Walker County, to extend over a period of twelve months from Apr. 1. The agreements embodied a clause allowing the cancellation of such contracts at the option of the railroad upon 30 days' notice in the event the lines were returned to private ownership, Government prices being paid for the fuel.

High-grade domestic coal is reported to be exceedingly scarce and the demand good. Contracts for this grade of fuel are being readily signed, and some improvement is also noted in the demand for cheaper coals. Several days of wintry weather boosted the retail market to some extent. Quotations remain steady as follows per net ton mines:

	Lump and Nut
Montevallo	$5.00
Cahaba and Black Creek	3.85
Carbon Hill	3.15
Big Seam	2.90

Coal production for the week ending Mar. 22, as reported to the Alabama Coal Operators' Association, totaled 289,071 net tons, a small increase over the week previous.

Coke

CONNELLSVILLE

Spot furnace coke easier. April adjustments not completed. Production continues to decline.

Instead of the meeting of coke operators at Uniontown stiffening the market situation, prompt furnace coke has been offered at lower prices than formerly. The Uniontown meeting developed a general opinion that furnace coke should bring $4.50 and that when that price could not be secured production should be restricted. Furnace coke of excellent grade has since sold at $3.75 in spot lots, and while the price has not been done on a month's supply, it is thought in some quarters it could be done.

Operators having adjustments for April shipments to make under contracts started out by asking $4.50, but this proved quite unacceptable to furnaces, and operators will do well if they settle at $4.25, the price that obtained in most of the March adjustments. Contracts that were written at "last Government price" are running at $6 in one or two instances, others remaining at the $5 price the operators conceded some time ago. Operators holding such contracts would probably be glad to make concessions if the furnace interests would undertake to run fuller and thus take more coke, but the furnaces are not in position to do this, finding it practically impossible to sell pig iron and depending entirely on their contracts, deliveries against which are slowing down.

Foundry coke is in only fair demand, and some operators who were asking the higher prices have reduced quotations; but the lower grades are unchanged. The market is now quotable as follows for spot and prompt shipment: Furnace, $3.75@4; foundry, $4.50@6, per net ton at ovens.

The "Courier" reports production in the Connellsville and Lower Connellsville region in the week ended Mar. 29 at 185,660 tons, a decrease of 2140 tons.

Buffalo—The trade is quiet and shows no improvement. As a rule the furnaces have a large supply of iron ore on hand and are in no hurry to bring down more, so it is quiet all along the line. The prospect is for some weeks of quiet, and then the trade will proceed with at least the normal activity. Coke is obtained mainly at the byproduct ovens here at prices that correspond with the prices of the Connellsville district, which are $7 for 72-hour foundry, $6 for 48-hour furnace and $4.50 to $5 for the lower grades, all f.o.b. Buffalo.

Middle Western

GENERAL REVIEW

Uncertainty characterizes attitude of buyer and seller alike. Railroad officials predict car shortage in near future. Feeling that dull period is past.

The coal market in the Middle West is more interesting today than it has been for some time. There is a feeling of uncertainty throughout the industry itself, as well as through the consuming public. Purchasing agents have not yet made up their minds whether they want to make a contract or whether they want to purchase coal on the open market. One week the purchasing agent is in favor of the open market plan, and the next week he favors a contract at all costs. The operator, although he is on the opposite side of the fence, has the same mingled feelings. In a great many instances the producer is not anxious to make a contract at present prevailing prices, because he feels that the labor situation is such that coal will be hard to get in some fields within 30 to 90 days, and he wants to have a lot of free coal, in order to take advantage of any such situation, should it arise. On the other hand, a contract looks pretty good to him, because it will allow him a small margin of profit, and he will be able to give his mines a steadier running time. It is noticeable that many more contracts have been reported this week than any previous week so far this season.

Railroad officials in North Dakota, South Dakota, Iowa, Wisconsin and Minnesota are predicting a great car shortage along about next July to October. The grounds for this prediction are that from all figures obtainable, our grain crop will be tremendous; in fact, very much greater than ever before. This, of course, is brought about by the Government's protection of wheat. This expected crop of wheat will have to be moved, and box-cars will be used. As a result there will be a tremendous shortage of box-cars, and the Northwest will have to depend on open equipment for its coal, something heretofore unknown.

A rather curious situation has arisen in the retail trade. The retailer does not take very favorably to the increased cost of anthracite coal, however just this increase may be. As a consequence, the retailers are predicting that less anthracite will move into the Middle West than ever before, and that this hard coal will be replaced by coke and by the better grade bituminous fuel from southeastern Kentucky and West Virginia. This situation is already beginning to be felt, as those operators producing very good coals from the eastern bituminous fields are reporting excellent market conditions, while we understand that but little anthracite is moving into the territory.

CHICAGO

Steam trade still dull. Prices being cut on eastern coals. Eastern Kentucky mine-run has obtained hold on local market.

The steam trade in Chicago continues dull, although a little more coal is moving than moved last week. The Chicago purchasing agents, however, do not seem to look with favor upon contracts, and we believe that the majority of them are planning to purchase their fuel on the open market. It will be interesting to see what the future has in store for these gentlemen.

The domestic trade is curious. West Virginia is anxious to get back its old standing in the Chicago retail market. There are many sales agencies in this city handling West Virginia coal, and as a result competition has been keen, rather than healthy. As a natural result, prices have been cut, and those dealers wishing Pocahontas, or other high-grade eastern coals, are able to buy them considerably under the market. The southeastern Kentucky operators, however, have not entered into this price-cutting orgy, as they are maintaining their prices in the face of the slices made by the West Virginia people. Some of the better grade eastern Kentucky coals have won a place in the Chicago market which cannot be taken from them.

We understand that a number of plants formerly using Pocahontas coal are now using eastern Kentucky mine-run. The demand for Franklin County, Clinton fourth vein coal, and other high-grade products produced in the Middle West, appears to be good, although there could be an improvement. The public—that is, the householder—is doing some buying, as he has just about come to the end of his winter supply of coal, and will need a few more tons to keep going until the summer sets in.

Prices per ton are as follows:

ILLINOIS

Southern Illinois Franklin, Saline and Williamson Counties, etc.	F.o.b. Mines	Rate to Chicago
Prepared sizes	$2.55@$2.75	$1.55
Mine-run	2.35@ 2.50	1.55
Screenings	1.85@ 2.20	1.55
Central Illinois		
Springfield District		
Prepared sizes	$2.55@$2.75	1.32
Mine-run	2.35	1.32
Screenings	2.05	1.32
Northern Illinois		
Prepared sizes	$3.25	1.24
Mine-run	3.00	1.24
Screenings	2.75	1.24

INDIANA

Clinton 4th Vein District		
Prepared sizes	$2.65@$2.75	1.27
Mine-run	2.35@ 2.45	1.27
Screenings	2.05@ 2.25	1.27
Knox County Field		
Prepared sizes	$2.65@$2.75	1.37
Mine-run	2.35@ 2.45	1.37
Screenings	2.05@ 2.25	1.37

MILWAUKEE

Warm weather and a glutted market fail to affect the price of coal. Slow buying continues. Coke piling up.

The coal market continues lifeless. There is a great surplus of supplies for the season, which continues warm. Private consumers and industries are simply buying enough to cover immediate needs. The problem of sustaining prices has been an easy one thus far, as there has been no disturbing competitive influence from the outside. A shading in soft coal is expected when Western operators get busy in the interior for the new season. Coke stocks are piling up at the byproduct plants, but prices are being maintained.

ST. LOUIS

Easy weather conditions and nothing to stimulate market. Everything is quiet, with domestic demand off to the extent that steam coal is beginning to strengthen. Outside coals plentiful with no demand.

The local situation continues easy. The weather has eliminated nearly altogether the demand for domestic coals. A week or two ago steam sizes were extremely heavy and the mines were idle on account of their inability to move them. The condition has changed now, and screenings are somewhat scarce. This, of course, is occasioned by reason of the fact that there is no demand for lump coal for domestic purposes, and with the falling off in this tonnage there is a decreased amount of screenings offered. There is no unusual demand for screenings, but it is the ordinary call at this time, which is commencing to catch up with the supply. This has a tendency to strengthen the steam market. On the other hand, nut is the slowest size right now. Egg size follows this, and the 2-in. lump is moving more freely than anything else on account of the usual call for this as the steam fuel.

Several of the mines have been down entirely on account of the dropping off of business and others are working one and two days a week. The railroad tonnage dropped off suddenly on the first, except temporary orders and temporary contracts.

Conditions are in a deplorable state throughout the Standard field, but with the operating companies getting at least cost for their output there is always room for improvement. The railroads are not taking up contracts as fast as was expected.

In the Mt. Olive field conditions continue in the same quiet, usual way characteristic of that section. The domestic tonnage is extremely light and there is nothing heavy in the way of steam. The mines are getting a couple of days a week and the coal is moving north.

In the Carterville field in Williamson and Franklin Counties, as well as the DuQuoin field of Perry County, lack of business is beginning to be felt more keenly by the larger operators, and a substantial supply of unbilled coal is usually on hand overnight. This has been mainly steam fuel, the demand for which, however, is beginning to catch up to the supply. A number of mines in this field are idle because many of the railroad contracts which expired on Apr. 1 have not been renewed.

The Missouri Pacific contract, with a maximum of 3000 tons daily, went to the West Virginia Coal Co. with mines in Williamson County, at a price, it is rumored, of $2.07½ per ton f.o.b. mines for mine-run. Other contracts have not been made public as yet, but the majority of the contracts in this field have not been closed. The open market price on some of this tonnage at the present time is $2.

The market is quiet and easy, and there is nothing to indicate that business will improve until some time in May.

In St. Louis proper everything is slow. Little anthracite is moving in, although the demand for country business is picking up some on chestnut size. Smokeless coal is plentiful, with no orders, and the demand for domestic coke is unusually light.

The prevailing circular at the present time f.o.b. the mines is:

Williamson and Franklin County		Mt. Olive and Staunton		Standard	
Association:					
Lump, egg and nut	$2.75	....		....	
Washed Nos 1 and 2 nut	2.85	....		....	
Independent:					
Lump, egg and nut	2.55	2.55	Lump and egg	2.25	
Washed Nos. 1 and 2 nut	2.85	....	2x3 nut	2.00	
Mine-run	2.35	2.20		2.00	
Screenings	2.20	2.05		1.75	
3-in. lump	....	2.30		....	
2-in. lump	....	....		2.15	
2x6 egg	....	....		2.10	

Williamson-Franklin rate to St. Louis is $1.07½; other rates $0.92½.

Coal and Coke Securities

New York Stock Exchange Closing Quotations Apr. 7, 1919

STOCKS	Ticker Abvn.	Bid	Asked
American Coal Co. of Allegheny	(ACL)	45	....
Burns Brothers, Com	(BB)	143	145
Burns Brothers, Pfd	(BB)	110	115
Central Coal & Coke, Com	(CK)	55	....
Central Coal & Coke, Pfd	(CK)	63	....
Colorado Fuel & Iron, Com	(CF)	42	43
Colorado Fuel & Iron, Pfd	(CF)	105	110
Consolidation Coal of Maryland	(CGM)	75	....
Elk Horn Coal, Com	(EH)	26	28
Elk Horn Coal, Pfd	(EH)	....	47
Island Creek Coal, Com	(ICR)	39	....
Island Creek Coal, Pfd	(ICR)	75	....
Jefferson & Clearfield Coal & Iron, Pfd	(JF)	60	....
New Central Coal of West Va	(NCC)	5	....
Pittsburgh Coal, Com	(PC)	48½	49
Pittsburgh Coal, Pfd	(PC)	86½	87
Pond Creek Coal	(PD)	14	17
Virginia Iron, Coal & Coke	(VK)	53	59

* Ex. Div.

BONDS	Bid	Asked
Cahaba Coal, 1st Gtd. 6s, 1922	90	....
Clearfield Bituminous Coal, 1st 4s, Ser. A, 1940	71	....
Colorado Fuel & Iron, Gen. 5s, 1943	89½	90
Colorado Indus. 1st Mtg. & Col. Tr. 5s, 1934	74½	75
Consolidation Coal of Maryland, 1st Ref. 5s, 1950	88	91
Lehigh Valley Coal, 1st Gtd. 5s, 1933	99	....
Lehigh Valley Coal, Gtd. Int. Red. to 4%, 1933	79½	....
Lehigh Val. Coal & Nav. Con. S. F., 4½s, Ser. A, 1954	90	....
Pleasant Valley Coal, 1st S. F. 5s, 1928	80½	....
Pocahontas Coal & Coke, Joint 4s, 1941	83½	84½
Pocahontas Con. Collieries, 1st S. F. 5s, 1957	86½	87½
Roch. & Pitts. Coal & Ir., Helvetia Pur. Money 5s, 1946	98	....
St. L., Rocky Mnt. & Pac. Stamped 5s, 1955	....	82½
Tenn. Coal, Iron & R.R., Gen. 5s, 1951	91	92
Utah Fuel, 1st Sinking Fund 5s, 1931	87	....
Victor Fuel, 1st Mtg. Sinking Fund 5s, 1953	55	70
Virginia Iron, Coal & Coke 1st 5s, 1949	85½	86

CURRENT PRICES—MATERIALS & SUPPLIES

IRON AND STEEL

PIG IRON—Quotations are f. o. b. cities named, unless noted otherwise.

	Current	One Month Ago
CINCINNATI		
No. 2 Southern	$30.35	$37.60
Northern Basic	27.55	31.80
Southern Ohio No. 2	28.55	32.80
NEW YORK, Tidewater delivery		
2X Virginia (silicon 2.25 to 2.75)	32.40	36.15
Southern No. 2 (Silicon 2.25 to 2.75)	34.70	39.95
BIRMINGHAM		
No. 2 Foundry	25.75	31.00
PHILADELPHIA		
Eastern Pa. 2X (silicon 2.25 to 2.75)	31.90*	36.15*
Virginia No. 2	33.25†	38.10†
Basic	29.65*	33.90*
Grey Forge	29.65*	33.90*
CHICAGO		
No. 2 Foundry Local	26.75	31.00
No. 2 Foundry Southern	33.00	37.25
PITTSBURGH, including freight charge from the Valley		
No. 2 Foundry Valley	26.25	31.00
Basic	25.75	30.00
Bessemer	29.35	33.60

* F.o.b. furnace. † Delivered.

STRUCTURAL MATERIAL—The following are the base prices, f.o.b. mill, Pittsburgh, together with the quotations per 100 lb. from warehouses at the places named:

	Mill	New York		St.	Chi-
	Pittsburgh	Current	One Year Ago	Louis	cago
Beams, 3 to 15 in.	$2.45	$3.47	$4.19½	$3.39	$3.47
Channels, 3 to 15 in.	2.45	3.47	4.19½	3.39	3.47
Angles, 3 to 6 in., ¼ in. thick	2.45	3.47	4.19½	3.39	3.47
Tees, 3 in. and larger	2.45	3.52	4.19½	3.39	3.47
Plates	2.66	3.67	4.44½	3.39	3.67

BAR IRON—Prices in cents per pound at cities named are as follows:

Pittsburgh	St. Louis	Denver	Birmingham
2.75	3.44	3.80	3.50

NAILS—Prices per keg from warehouse in cities named:

	Mill Pittsburgh	St. Louis	Denver	Chicago	Birmingham	San Francisco	Dallas
Wire	$3.25	$4.00	$5.11	$4.37	$4.50	$5.00	$4.75
Cut	3.45	6.50	5.61	6.50	....	6.75	....

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	Pittsburgh	Cincinnati	Chicago	St. Louis	San Francisco	Birmingham	Denver
Standard railroad spikes ⅜-in. and larger	$3.25	$6.60	$4.27	$5.04	$6.15	$5.25	$5.55
Track bolts	4.90	8.90	5.17	Prem.	7.20	8.00	6.55
Standard section angle bars	3.00	....	4.22	Prem.	4.95	....	4.95

COLD DRAWN STEEL SHAFTING—From warehouse to consumers requiring fair-sized lots, the following discounts hold:

Cincinnati	Cleveland	Chicago	St. Louis	Denver	Birmingham
17½%	List —5%	List —2%	+15%	+30%	+20%

HORSE AND MULE SHOES—Warehouse prices per 100 lb. in cities named:

	Mill Pittsburgh	Cincinnati	Chicago	St. Louis	Denver	Birmingham
Straight	$5.75	$7.50	$6.50	$7.25	$8.50	$7.35
Assorted	6.40	7.50	6.50–7.00	6.40	8.75	7.60

Cincinnati—Horseshoe nails sell for $4.50 to $5 per 25-lb. box.

CAST-IRON PIPE—The following are prices per net ton for carload lots:

	New York						
	Current	One Month Ago	One Year Ago	Chicago	St. Louis	San Francisco	Dallas
4 in.	$60.70	$65.70	$58.35	$59.80	$53.00	$82.55	$65.00
6 in. and over	57.70	62.70	55.35	56.80	50.00	79.55	62.00

Gas pipe and 16-ft. lengths are $1 per ton extra.

STEEL RAILS—The following quotations are per ton f.o.b. Pittsburgh and Chicago for carload or larger lots. For less than carload lots 5c. per 100 lb. is charged extra:

	Pittsburgh		Chicago	
	Current	One Year Ago	Current	One Year Ago
Standard Bessemer rails	$45.00	$55.00	$45.00	$65.00
Standard openhearth rails	47.00	57.00	47.00	67.00
Light rails, 8 to 10 lb.	2.58½*	3.13½*	2.83½*	3.13½*
Light rails, 12 to 14 lb.	2.54*	3.09*	2.79*	3.09*
Light rails, 25 to 45 lb.	2.45*	3.00*	2.70*	3.00*

* Per 100 lb.

OLD MATERIAL—The prices following are per gross ton paid to dealers and producers in New York. In Chicago and St. Louis the quotations are per net ton and cover delivery at the buyer's works, including freight transfer charges:

	New York	Chicago	St. Louis
No. 1 railroad wrought	$18.50	$15.00	$15.50
Stove plate	16.00	15.00	15.50
No. 1 machinery cast	22.50	20.00	19.50
Machine shop turnings	8.50	6.00	7.00
Cast borings	10.00	7.00	7.50
Railroad malleable cast	13.50	15.50	14.00

COAL BIT STEEL—Warehouse price per pound is as follows:

New York	Cincinnati	Birmingham	St. Louis	Denver
$0.12	$0.16½	$0.18	$0.13	$0.18½

DRILL STEEL—Warehouse price per pound:

	New York	St. Louis	Birmingham
Solid	16c.	13c.	15c.
Hol'ow	24c.	.....	..

PIPE—The following discounts are for carload lots f.o.b. Pittsburgh; basing card of Jan. 1, 1919 for steel pipe and for iron pipe:

BUTT WELD

Inches	Steel Black	Steel Galvanized	Inches	Iron Black	Iron Galvanized
⅛, ¼ and ⅜	50½%	24%	¼ to 1¼	39½%	23½%
½	54½%	40%			
¾ to 3	57½%	44%			

LAP WELD

2	50½%	35%	2	32½%	18½%
2½ to 6	53½%	41%	2½ to 4	34½%	21½%

BUTT WELD, EXTRA STRONG PLAIN ENDS

⅛, ¼ and ⅜	46½%	29%	½ to 1¼	39½%	24½%
½	51½%	39%			
¾ to 1¼	55½%	43%			

LAP WELD, EXTRA STRONG PLAIN ENDS

2	48½%	37%	2	33½%	20½%
2½ to 4	51½%	40%	2½ to 4	35½%	23½%
4½ to 6	50½%	39%	4½ to 6	34½%	22½%

Stocks discounts in cities named are as follows:

	New York		Cleveland		Chicago	
	Black	Galvanized	Black	Galvanized	Black	Galvanized
⅛ to 3 in. steel butt welded	47%	31%	46½%	31%	57½%	44%
¾ to 3 in. steel lap welded	42%	27%	42½%	27½%	53½%	41%

Malleable fittings. Class B and C, from New York stock sell at list + 12½%
Cast iron, standard sizes, 10% off.

WIRE ROPE—Discounts from list price on regular grades of bright and galvanized are as follows:

	New York and St. Louis
Galvanized iron rigging	+12½%
Galvanized cast steel rigging	+ 7½%
Bright plain rigging	35%
Bright cast steel	22½%
Bright iron and iron tiller	5%

STEEL SHEETS—The following are the prices in cents per pound from jobbers' warehouse at the cities named:

	Pittsburgh, Mill in Carloads	New York Current	New York One Month Ago	New York One Year Ago	Cleveland Current	Chicago Current
*No. 28 black	4.35	5.62	6.22	6.45	5.27	5.37
*No. 26 black	4.25	5.52	6.12	6.35	5.17	5.27
*Nos. 22 and 24 black	4.20	5.47	6.07	6.30	5.12	5.22
Nos. 18 and 20 black	4.15	5.42	6.02	6.25	5.07	5.17
No. 16 blue annealed	3.75	4.77	5.37	5.65	4.67	4.77
No. 14 blue annealed	3.65	4.67	5.27	5.55	4.57	4.67
No. 10 blue annealed	3.55	4.57	5.17	5.45	4.47	4.57
*No. 18 galvanized	5.70	7.42	7.57	7.70	6.62	6.72
*No. 26 galvanized	5.40	7.12	7.27	7.40	6.32	6.42
No. 24 galvanized	5.25	6.97	7.12	7.25	6.17	6.27

* For painted corrugated sheets add 30c. per 100 lb. for 25 to 28 gage; 25c. for 19 to 24 gages; for galvanized corrugated sheets add 15c., all gages.

SHOP SUPPLIES

NUTS—From warehouse at the places named, on fair sized orders, the following amount is deducted from list:

	New York Current	New York One Year Ago	Cleveland Current	Cleveland One Year Ago	Chicago Current	Chicago One Year Ago
Hot pressed square	$0.25	$1.00	$1.75	$1.40	$1.28	$1.05
Hot pressed hexagon	.25	1.00	1.60	1.20	1.08	.85
Cold punched square	.25	1.00	1.50	.75	1.30	1.00
Cold punched hexagon	.25	1.00	1.50	.75	1.30	1.00

* List plus.

Semi-finished nuts sell at the following discounts from list price:

	Current	One Year Ago
New York	50—10%	40%
Chicago	50%	50%
Cleveland	50—60%	60%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
½ by 4 in. and smaller	40%	50%	45—5%
Larger and longer up to 1 in. by 30 in.	50%	40%	40%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

For wrought-iron washers:
New York..$2.00 Cleveland..$2.00 Chicago..$2.25

For cast-iron washers the base price per 100 lb. is as follows:
New York..$5.00 Cleveland..$4.00 Chicago..$4.00

RIVETS—The following quotations are allowed for fair sized orders from warehouse:

	New York	Cleveland	Chicago
Steel ½ and smaller	4–10–5%	55%	45%
Tinned	30%	55%	40%

Boiler, ¾, ⅞, 1 in. diameter by 2 in. to 5 in. sell as follows per 100 lb.:
New York..$6.35 base Cleveland..$5.00 Chicago..$4.87 Pittsburgh...$4.65

Structural, same sizes:
New York..$6.25 Cleveland..$5.10 Chicago..$4.97 Pittsburgh...$4.75

CONSTRUCTION MATERIALS

LINSEED OIL—These prices are per gallon:

	New York Current	New York One Year Ago	Cleveland Current	Cleveland One Year Ago	Chicago Current	Chicago One Year Ago
Raw in barrel	$1.55	$1.55	$1.68	$1.65	$1.66	$1.65
5-gal. cans	1.70	1.65	1.85	1.80	1.86	1.75

WHITE AND RED LEAD—Base price.

	Red Current Dry	Red Current In Oil	Red 1 Year Ago Dry	Red 1 Year Ago In Oil	White Current Dry and In Oil	White 1 Year Ago Dry and In Oil
100-lb. keg	13.00	14.50	12.25	12.50	13.00	12.25
25 and 50-lb. kegs	13.25	14.75	12.50	12.75	13.25	12.50
12½-lb. keg	13.50	15.00	12.75	13.00	13.50	12.75
5-lb. cans	15.00	16.50	14.25	14.00	15.00	14.50
1-lb. cans	16.00	17.50	14.25	14.50	16.00	14.50

500 lb. lots less 10% discount. 2000 lb. lots less 10–2½% discount.

COMMON BRICK—The prices per 1000 in cargo or carload lots are as follows:

Cincinnati	$15 and 16	Birmingham	$15.00
St. Louis, salmon	10.00	Denver	12.00

PREPARED ROOFINGS—Standard grade rubbered surface, complete with nails and cement, costs per square as follows in New York, St. Louis, Chicago and San Francisco.

	1-Ply C.l.	1-Ply L.c.l.	2-Ply C.l.	2-Ply L.c.l.	3-Ply C.l.	3-Ply L.c.l.
No. 1 grade	$1.35	$1.60	$1.70	$1.95	$2.05	$2.30
No. 2 grade	1.20	1.45	1.50	1.75	1.80	2.05

Asbestos asphalt saturated felt (14 lb. per square) costs $5.00 per 100 lb.

Slate-surfaced roofing (red and green) in rolls of 108 sq.ft. costs $2.10 per roll in carload lots and $2.35 for smaller quantities.

Shingles, red and green slate finish cost $5.75 per square in carloads, $5.75 in smaller quantities, in Philadelphia.

ROOFING MATERIAL—Prices per ton f. o. b. New York and Chicago:

	Carload Lots N. Y.	Carload Lots Chicago	Less Than Carload Lots N. Y.	Less Than Carload Lots Chicago
Tar felt (14 lb. per square of 100 sq.ft.)	$52.00	$52.50	$53.00	$53.50
Tar pitch (in 400-lb. bbl.)	19.00	16.00	20.00	17.00
Asphalt pitch (in barrels)	36.00	36.00	41.50	41.50
Asphalt felt	67.50	67.50	72.00	72.00

HOLLOW TILE—Price per block in carload lots for hollow building tile:

	4x12x12	8x12x12	12x12x12
St. Paul	$0.056	$0.11	$0.162
Seattle	.09	.175	.30
Los Angeles*	.082	.154	.236
New Orleans	.17	.23	.34

*F. o. b. factory, 4, 8 and 10 inch.

LUMBER—Price of pine per M in carload lots:

	1-In. Rough 10 In. x 16 Ft.	2-In. T. and G. 10 In. x 16 Ft.	8 x 8 In. x 20 Ft.
St. Louis	$38@41	$38.00	$40.00
Birmingham	39.00	33.00	31.00
Denver	45.00	38.00	44.00
Cincinnati	43.00	42.00	37.00

EXPLOSIVES—Price per pound of dynamite in small lots and price per 25-lb. keg for black powder:

	Low Freezing 20%	Gelatin 40%	Gelatin 60%	Gelatin 80%	Black Powder
New York	.....	$0.27½	$0.30	.....	$2.40
Boston	$0.22½	.24½	.26½	$0.31	2.40
Cincinnati	.19½	.21½	.23½	.....	2.35
Kansas City	.20½	.25½	.30½	.38½	2.45
New Orleans	.....	.24½	.28½	.....	.....
Seattle	.....	.18½	.21	.....	.....
Chicago	.18½	.21½	.25½	.29½	2.35
St. Paul	.19	.25½	.30½	.....	2.45
St. Louis	.19	.23½	.25½	.30	2.35
Denver	.17½	.24	.29	.35	2.60
Dallas	.21	.27½	.32	.38	.....
Los Angeles	.23	.30	.37	.....	2.95

MISCELLANEOUS

GREASES—Prices are as follows in the following cities in cents per pound for barrel lots:

	Cincinnati	St. Louis	Birmingham	Denver
Cup	7	7.2	8	14½
Fiber or sponge	8	13	9	18
Transmission	7	13	8½	20
Axle	4½	4½	3½	5½
Gear	4½	7½	6½	8
Car journal	22 (gal.)	4.9	3½	8

BABBITT METAL—Warehouse prices in cents per pound:

	New York Current	New York One Year Ago	Cleveland Current	Cleveland One Year Ago	Chicago Current	Chicago One Year Ago
Best grade	87.00	90.00	77.00	90.00	75.00	90.00
Commercial	42.00	50.00	18.50	30.00	15.00	30.00

HOSE—Following are prices of various classes of hose:

Fire

	50-Ft. Lengths
Underwriters' 2½-in.	70c. per ft.
Common, 2½-in.	30%

Air

	First Grade	Second Grade	Third Grade
¾-in. per ft.	$0.55	$0.40	$0.30

Steam—Discounts from list
First grade..... 25% Second grade.... 35% Third grade..... 40%

LEATHER BELTING—Present discounts from list in cities named:

	Medium Grade	Heavy Grade
St. Louis	45%	50%
Denver	35–5%	30%
Birmingham	30%	35%
Chicago	45%	35%
Cincinnati	40–10%	30%

RAWHIDE LACING—20% for cut; 45c. per sq.ft. for ordinary.

PACKING—Prices per pound:

Rubber and duck for low-pressure steam	$0.90
Asbestos for high-pressure steam	1.60
Duck and rubber for piston packing	1.00
Flax, regular	1.20
Flax, waterproofed	1.60
Compressed asbestos sheet	1.00
Wire insertion asbestos sheet	1.20
Rubber sheet	.60
Rubber sheet, wire insertion	.80
Rubber sheet, duck insertion	.50
Rubber sheet, cloth insertion	.30
Asbestos packing, twisted or braided, and graphited, for valve stems and stuffing boxes	1.20
Asbestos wick, ½- and 1-lb. balls	.85

MANILA ROPE—For rope smaller than ¾-in. the price is ½ to 2c. extra; while for quantities amounting to less than 600 ft. there is an extra charge of 1c. The number of feet per pound for the various sizes is as follows: ¼-in., 8 ft., ½-in., 6; ⅝-in., 4½; 1 in., 3½; 1¼-in., 2 ft. 10 in.; 1½-in., 2 ft. 4 in. Following is price per pound for ¾-in. and larger, in 1200-ft. coils:

Boston	$0.26	Atlanta	$0.30
New York	.29	Denver	.29
Cincinnati	.29	Kansas City	.28
Chicago	.26½	New Orleans	.72
St. Paul	.30	Seattle	.27
San Francisco	.26	Los Angeles	.34

PIPE AND BOILER COVERING—Below are discounts and part of standard lists:

PIPE COVERING Pipe Size	Standard List Per Lin.Ft.
1-in.	$0.27
2-in.	.36
6-in.	.80
4-in.	.60
3-in.	.45
8-in.	1.10
10-in.	1.30

BLOCKS AND SHEETS Thickness	Price per Sq.Ft.
½-in.	$0.27
1-in.	.30
1½-in.	.45
2-in.	.60
2½-in.	.75
3-in.	.90
3½-in.	1.05

85% magnesia high pressure ..... List

For low-pressure heating and return lines ..... 4-ply.... 58% off; 3-ply.... 60% off; 2-ply.... 62% off

WIRING SUPPLIES—New York prices for tape and solder are as follows:

Friction tape, ⅙ lb. rolls	48c. per lb.
Rubber tape, ⅓-lb. rolls	60c. per lb.
Wire solder, 50-lb. spools	46c. per lb.
Soldering paste, 2-oz. cans	$1.20 per doz.

COPPER WIRE—Prices per 1000 ft. for rubber-covered wire in following cities:

No.	Denver Single Braid	Denver Double Braid	Denver Duplex	St. Louis Single Braid	St. Louis Double Braid	St. Louis Duplex	Birmingham Single Braid	Birmingham Double Braid	Birmingham Duplex
14	$11.00	$14.50	$30.40	$21.00	$16.00	$33.00	$10.95	$15.25	$27.75
10	19.20	25.70	49.00	27.20	31.00	69.00	20.25	21.25	46.90
8	26.95	34.22	67.00	38.00	42.00	78.00	27.60	32.60	.....
6	43.90	46.20	.....	.....	65.00	130.00	48.25	54.75	.....
4	62.35	65.15	.....	.....	93.00	.....	66.90	73.75	.....
2	92.60	96.25	.....	.....	140.00	.....	96.00	104.50	.....
1	120.95	125.20	.....	.....	182.00	.....	121.00	136.40	.....
0	164.80	164.80	.....	.....	242.00	.....	169.00	174.60	.....
00	.....	203.35	.....	.....	290.00	.....	203.50	214.00	.....
000	.....	208.40	.....	.....	360.00	.....	246.50	257.00	.....
0000	.....	302.55	.....	.....	435.00	.....	295.50	358.50	.....

FREIGHT RATES—On finished steel products in the Pittsburgh district including plates, structural shapes, merchant steel, bars, pipe fittings, plain and galvanized wire nails, rivets, spikes, bolts, flat sheets (except planished), chains etc., the following freight rates per 1000 lb. are effective:

Boston	$0.30	New Orleans	$0.38½
Buffalo	.17	New York	.27
Chicago	.27	Philadelphia	.24½
Cincinnati	.23	St. Louis	.24
Cleveland	.17	St. Paul	.49*
Denver	.99	Pacific Coast (all rail)	1.25*
Kansas City	.59		

Note—Add 3% transportation tax. Minimum carload, 80,000 lb.